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## NAIL DISTRIBUTIONS AS STRUCTURAL INSIGHT AT THE BEAVER CREEK TRAIL CROSSING SITE (25SW49), SEWARD COUNTY, NEBRASKA

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NAIL DISTRIBUTIONS AS STRUCTURAL INSIGHT AT THE BEAVER CREEK  
TRAIL CROSSING SITE (25SW49), SEWARD COUNTY, NEBRASKA

By

David M. Amrine

A THESIS

Presented to the Faculty of

The Graduate College at the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Master of Arts

Major: Anthropology

Under the Supervision of Professor Paul A. Demers

Lincoln, Nebraska

July, 2010

NAIL DISTRIBUTIONS AS STRUCTURAL INSIGHT AT THE BEAVER CREEK  
TRAIL CROSSING SITE (25SW49), SEWARD COUNTY, NEBRASKA

David M. Amrine, M.A.

University of Nebraska, 2010

Advisor: Paul A. Demers

During the 2005 and 2006 archaeological field schools headed by the Department of Anthropology at the University of Nebraska-Lincoln, excavations were carried out at the Beaver Creek Trail Crossing Site (25SW49), in Seward County, Nebraska. These excavations recovered various kinds of artifacts including a large assemblage of nails. Using data from nails recovered from both the 2005 and 2006 field seasons, this thesis shows that the counts and spatial distributions of the machine-cut nails in the assemblage are consistent with photographs of the site taken in 1866. It also argues for the use of nails as major structural indicators when activities such as salvaging have removed any other structural remains at a site. This activity occurred often in the Midwest, making nails especially useful in this region of North America.

## Acknowledgements

I would like to take this opportunity to thank all of those who have contributed to this thesis and its completion in any way possible. First of all, I would like to thank my wife, Kyra, for encouraging me throughout this process, even when I felt I would never finish my Masters Degree. She has been with me the entire time I have been at UNL, and I feel I would have quit were it not for her support. I would also like to thank Dr. Paul Demers, my graduate advisor and thesis committee chair, for suggesting the nails of Beaver Crossing as a project large enough, but bite-sized enough, to do for a thesis. He was also one of those who welcomed me to UNL with open arms and has made my experience here very rewarding through clear guidance and encouragement.

I would also like to thank Dr. Peter Bleed, Dr. LuAnn Wandsnider, Dr. Effie Athanassopolous, Dr. Carlene Sanchez, and Dr. Raymond Hames for providing me with quality education and support that has helped to write this thesis and finish my Masters Degree in two years. I am grateful for Dr. Bleed's advice to find a "bite-sized piece" of the literature to work with for my thesis. I would also thank my fellow students: Rob Kilts, Matt Seger, Jay Schwaninger, Nancy Roll, Chris Nycz, Cynthia Wiley, Drew LaBounty, Lucas Schwartze, Al LeBeau, Nicolas Cabrera and all the others who have offered information, advice, instruction, friendship, and their aid in completing research for this work. In addition, I would like to thank Barbara Trail and Kathy Hellwedge, the best departmental secretaries I have ever worked with, for their support in help with my thesis paperwork and all of the other paperwork that goes into a Masters degree. Finally, I would thank Nolan Johnson for his excellent thesis on Beaver Crossing in addition to all of those who worked in the 2005 and 2006 field schools at UNL. Without them, I would have no data.

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## **Introduction and Thesis Organization**

### **Introduction**

This thesis is a result of a year and a half of analytical work on the nails of the Beaver Creek Trail Crossing Site (25SW49), Seward County, Nebraska. The site, located along what was once the Nebraska City Cut-Off, is found on the eastern side of the original fording location along Beaver Creek and to the northwest of the trail. From 1862-1871, the site was the location of a road ranch that supported travelers as they forded the stream. Past research done on the site has shown that it was likely the road ranch owned and built first by John Leonard (1862-1866), then sold to Roland Reed, who owned the ranch until the abandonment of the site around 1871 (Demers, Dempsey, and Johnson 2006, Johnson 2006). During its use, the road ranch catered to travelers by trading animals and selling supplies. On the western side of the creek, John Fouse built what was described as a “Wild West Saloon” in 1864 as he settled the area. Like the Reed Ranch, this site was also abandoned in 1871 (Johnson 2006). After abandonment, the site was heavily salvaged, leaving a scattered and ephemeral archaeological record that is difficult to interpret (Johnson 2006).

Excavation of Beaver Crossing occurred in the summer field seasons of 2005 and 2006 as a part of the University of Nebraska - Lincoln field school. Photos of the site, along with historical resources, showed that a shingled log house with a nearby well and sod-style additions had been the property of Roland Reed. This information was used to guide excavation of the site, with test units for both 2005 and 2006 being set up where the well and log house may have been. Although evidence suggests that 25SW49 is the



location of the Roland Reed Ranch, salvaging at the site has made archaeological signatures more difficult to interpret (Johnson 2006).

The nail assemblage recovered during the 2005 and 2006 field seasons at 25SW49 has been characterized several times (Demers, Dempsey, and Johnson 2006; Demers et al. 2007, Demers in press, Johnson 2006). This thesis describes the nails from both 2005 and 2006 and combines them into one database for spatial analysis of the site as a whole. Focusing on the machine-cut nails (1543 of the 1746 nails found), this thesis will provide structural insights about the building that once existed at the site. It will provide evidence that the site is consistent with the Roland Reed Ranch as shown in photographs from the period of occupation.

### **Thesis Organization**

Chapter 1 of this thesis will provide a history of Beaver Creek Trail Crossing along with a short summary of excavation activities at the site. Since both of these subjects have been covered in detail in other volumes (Demers, Dempsey, and Johnson 2006; Demers et al. 2007, Demers in press, Johnson 2006), this chapter will focus on the main history of the Roland Reed ranch and will summarize the 2005 and 2006 field seasons.

Chapter 2 will focus on the methods of nails description and analysis used in regard to Beaver Crossing. The chapter will explain the variables used or left out in the description of the nails in both 2005 and 2006. This will include a brief background discussion of the study of nails in general and how that has affected the decisions in this study. The chapter will also outline how these different variables were reconciled in order to merge the data for this thesis. Finally, it will discuss the decision to use GIS for finding patterns within the site.

Chapter 3 is a discussion of the structural insights gained from looking at the distribution and character of nails at Beaver Crossing. First, a general description of the nails at the site will be provided (overall counts, the most common nail-sizes and what that may mean, etc). Following this, a discussion of the distribution of different nail categories and their meaning will be discussed (fragmentary nails, bent nails, whole nails, etc). This will include a discussion of assumptions behind this study and an account of the material expectations of the data. Finally, evidence consistent with the Beaver Crossing excavation site as the site of the Roland Reed ranch will be evaluated and the importance of nails at the site discussed.

Chapter 4 will discuss other insights gained from the nails at Beaver Crossing. The chapter will look at aspects of the site not covered in the main body of the thesis. These include fasteners other than machine-cut nails, prominent features at the site that have evidence of burning and piling of materials during salvage. In addition, future possibilities for study, such as further excavation and testing for the effects of soil creep at Beaver Crossing will be discussed here.

The concluding section of this thesis will summarize the evidence that the Beaver Crossing excavation site is the actual location of the Roland Reed ranch. It will also argue for the importance of nails in interpreting Midwestern and other sites that have been salvaged, leaving only nails and other small artifacts as structural evidence. Finally, this section will review some of the future directions study at Beaver Crossing might take based on evidence from the nails.

## **Chapter 1 – A Brief History of the Beaver Creek Crossing Site and Excavation Activities in 2005 and 2006**

This chapter will provide a brief background discussion of the Beaver Creek Trail Crossing Site (hereafter referred to as BC) and the excavation activities in 2005 and 2006. Since the history of the site has been covered in more detail in other publications (see Demers, Dempsey, and Johnson 2006; Johnson 2006; Mattes 1987; Waterman 1927), there will only be a short summary of major events involving the specifics Roland Reed Ranch, a specific building attributed to the site. Those who are interested in a more detailed discussion of the site's history should refer to the above works.

### **Site History**

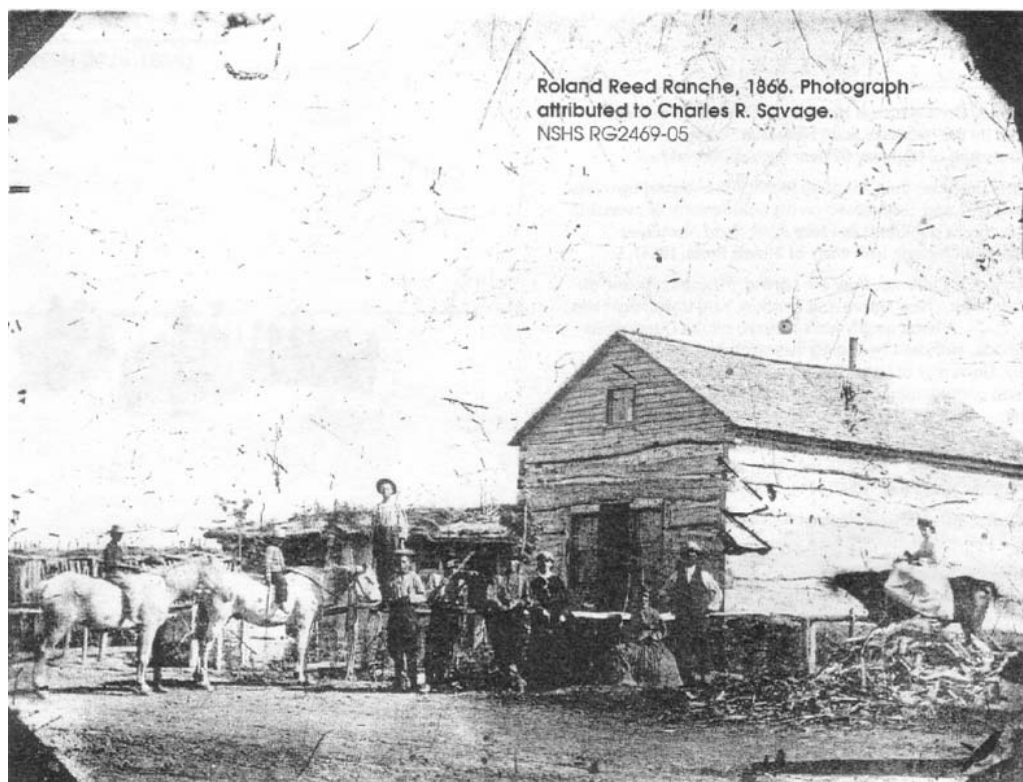
The original location of Beaver Crossing was along the Nebraska-City Cut-Off at a spot that provided relatively easy fording of Beaver Creek. Starting in 1862, a pair of families settled near the ford, providing supplies to and trading with travelers that passed along this portion of the Cut-Off. The settlement eventually grew large enough to support a small post-office and buildings on either side of the Creek. However, by 1871, the site was abandoned because of the completion of railroads and a grist mill at the present-day location of Beaver Crossing (Demers, Dempsey, and Johnson 2006).

The site that was excavated in 2005 and 2006, on the eastern side of Beaver Creek north of the swale that surrounded the wagon road (Figure 1), is purportedly the site of a shingled log house built by John Leonard in 1862. Leonard lived in the cabin and ran a small feed business at the site until 1866, when he sold it to the brother of Roland Reed, whose family continued to sell feed to passersby in addition to selling food and other supplies (Johnson 2006). During the occupation of the site, photographs were taken of the

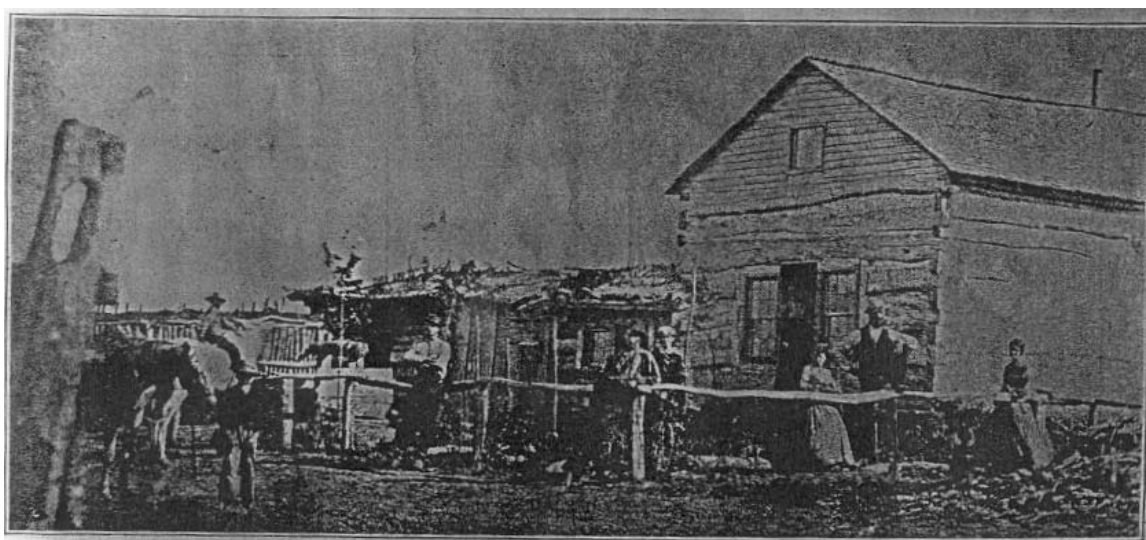
site, including one that has survived well and shows the Roland Reed Ranch in 1866 (Figures 2 and 3).



**Figure 1.** GoogleEarth oblique image of 25SW49. From Demers (in press).



**Figure 2.** Photograph of the Reed Ranch House at Beaver Crossing (1866) (Courtesy of Nebraska State Historical Society RG2469-05)



**Figure 3.** Photograph of the Reed Ranch showing well and ells (Nebraska State Historical Society R-629-4).

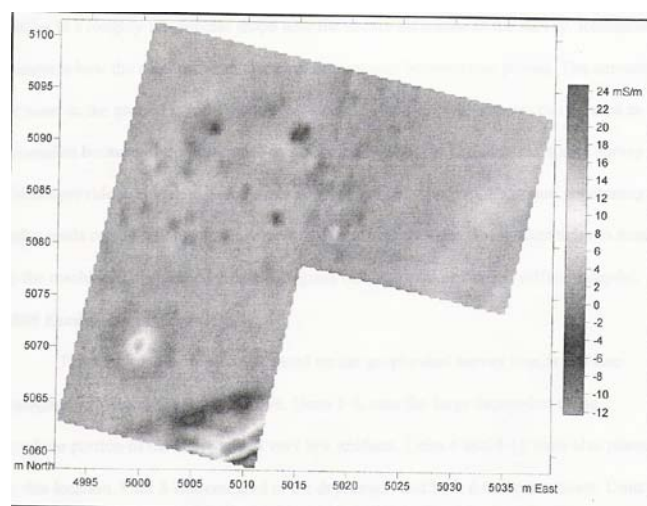
Reed and his family continued their business at the original site of BC until its abandonment in 1871. Since that time, the site was heavily salvaged, leaving few structural elements and scattering remaining artifacts across the site (Johnson 2006). It is difficult to determine the identity of the salvagers, but it may have been the Reed family themselves as they moved east to the new, present day location of BC.

### **Study, Survey, and Excavation History**

In the summer of 2005, field school students from the University of Nebraska - Lincoln, directed by Paul Demers, began investigations of the site. Studies included geophysical survey followed by excavation based on the geophysical results.

### **Geophysical Survey**

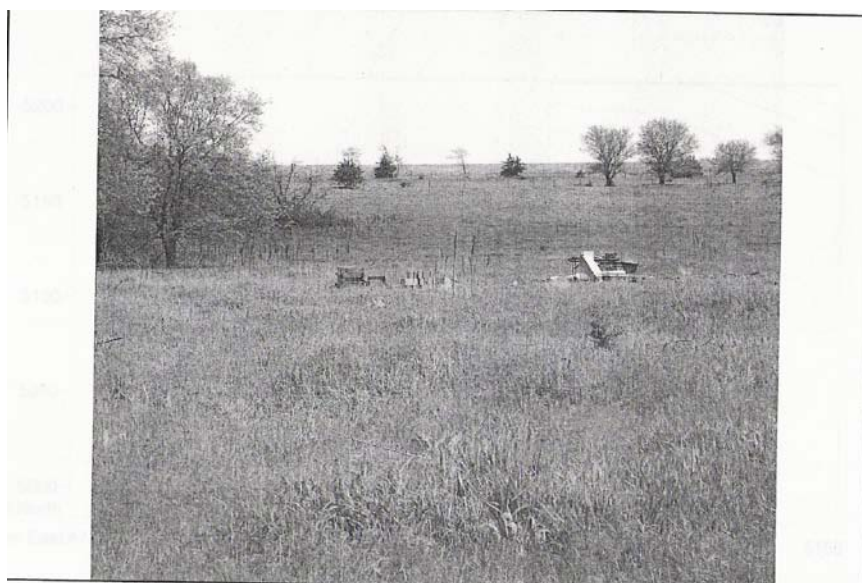
Surveying the site using Magnetic Gradient Survey, Conductivity Survey, Resistivity survey, and Ground Penetrating Radar (Johnson 2006), researchers were able to locate a number of anomalies on the east side of the creek near a visible depression and rectangular mound. These surface features and remote sensing anomalies were located just north northwest of the trail ruts marking the road through BC (Figure 4, 5, and 6).



**Figure 4.** Conductivity survey image of the depression (SW) and the rectangular mound (NW). From Johnson (2006).



**Figure 5.** Photograph of the east side depression (Johnson 2006)



**Figure 6.** Photograph of the east side rectangular mound (Johnson 2006)

### **Excavation**

Using the surface features, remote sensing, and available photographs as a guide, two-by-two meter, one-by-two meter, and one-by-one meter test units were dug in the location of the depression and the rectangular mound. One set of units (1-8) was placed

around the depression, which was suspected to be the well seen in the photographs of the site (Figures 2 and 3). The rest of the units (9-41) dug in 2005 (excluding test units 16 and 17, which were placed on the west of Beaver Creek) were placed in an attempt to follow evidence of cabin walls. In order to do this, they staggered unit placement according to what they found (e.g. mortar, limestone smears, etc.) and utilized the photographs in 1866 to estimate the building's possible location. In order for the photographs to be used to interpret the site, they used the trail ruts as a point of reference and attempted to determine the locations of building corners by assuming that the building's long axis would face the trail (Johnson 2006).

Returning in 2006, the field camp returned and initiated a series of test units and shovel tests. The shovel tests were conducted on both the west and east side of Beaver Creek, but yielded little data concerning the building shown in the 1866 photographs. However, the test units placed at the site were focused on the cabin site from the previous year. Thirty test units were dug, 28 of which were two-by-two meters with one two-by-one and one 3-square meter unit (43). Excavators adopted a checkerboard pattern of test-units in 2006 in order to cover gaps from the previous year, find the limits of the occupation zone at the log house site, and to open as much ground as possible in hope of finding more structural evidence and evidence of salvaging (Johnson 2006: 33).

Overall, in 2005 and 2006, the site was heavily excavated and a significant amount of ground was covered in order to uncover evidence of the Roland Reed Ranch (see Figure 9). Large numbers of artifacts including nails, historic ceramics, faunal remains, pane glass, container glass, daub, beads, ballistics, buttons, and even some prehistoric ceramics and lithics were recovered during excavation (Demers in press). In addition, a number of



features confirming the location of a building were found, including mortar and limestone smears, daub, and other structural remains that allowed estimation of building dimensions. Other features found consisted mainly of possible burn pits and one trash pit for the occupants of the site (Demers, Dempsey, and Johnson 2006; Johnson 2006).

Four publications came out of the excavation, including a report of excavation activities and artifact analyses from 2005 written by the students under the direction of Paul Demers (2007), one thesis, written by Nolan Johnson (2006), focusing on the salvaging activity at the site, an interim report on the 2006 nail data (Amrine et. al. 2009), and an article on the site by Paul Demers (Demers in press). The report provided brief analyses of the different artifact classes found at the site, along with background research, and an initial discussion of the salvaging activities at the site. As far as nails are concerned, a section written by Tristan Harrenstein (2006) gave a brief description of the nails found in 2005 along with some basic interpretations from the existent data. Overall, the nails seemed to support salvaging at the site and provided some basic insights into the building's construction, showing that shingling nails were the most abundant, though there were some large framing-sized nails found as well which will be addressed in this thesis. Aside from the report, the nails of 2005 were described in detail during post-field analysis of the recovered artifacts. The variables chosen in this description will be discussed in the following chapter.

Nolan Johnson's thesis focused on evidence for salvaging at the site. He utilized the stratigraphy of the features found at the site for interpretation, but also provided evidence based on the different artifact types present. Classifying nails as 'non-structural' artifacts because of their possible use in furniture, Johnson still argued that the nails at BC are

largely structural in nature (2006: 110). His thesis provided considerable detail, showing that the nails followed a pattern similar to other structural artifacts in the site. In addition, the presence of siding (which also indicates framing) on the upper portion of the building (Figure 2) was pointed out as coincident with the larger framing nails of size 6d and up that were found at the site. Finally, Johnson's thesis discussed the distribution of the nails, arguing that many were left where they lay after they were pulled from building wood, that some of the larger whole nails were likely saved, and that the remaining broken and bent nails were the final results of salvage activity.

The other works mentioned above, the interim report on the 2006 nails (Amrine et al. 2009) and the article on BC by Paul Demers (in press), provided basic descriptive data of the nails from 2006 and an archaeological overview of BC as a whole, respectively. Both will be cited further in this thesis.

At the point in which Johnson's thesis was published, the nails excavated in 2006 were only described in terms of initial counts. This thesis picks up where these previous works have left off with the nails. Although some structural insights were gained from the nails in previous publications, further description and analysis of the 2006 nails was necessary in order to find out more. This work was completed in the spring of 2009 (Amrine et al. 2009). In addition, a greater level of detail in studying certain features and patterns of nail-sizes and types would also provide more insight into the building at the site. The following chapter will cover these procedures in more detail and will provide the theoretical basis for description and investigation of the data.

## **Chapter 2: Understanding the Nails at Beaver Crossing – Nail Research Background and Methods**

This chapter presents the methods and variables used to describe and explore the nails of BC. First, the chapter will provide a brief history of the archaeological study of nails, showing how it has changed up to the present time and pointing out ideas that have influenced this thesis. Second, the chapter summarizes variables used to describe the nails from 2005 when they were initially analyzed by students at UNL. Third, the same process for 2006 will be discussed, including variables deemed important and differences between the 2005 and 2006 nail data. Fourth, the process of joining these two sets of data for analysis of the entire nail assemblage will be discussed. This will include how details were fused and how they were changed in order to merge the 2005 and 2006 nail data. Finally, the chapter will explain the use of GIS in the process of exploring the nails at BC.

### **A Brief History of Nail Study**

In general, the detailed study of nails began with their importance in dating old buildings. Two of the most widely cited and used chronologies of nails are Henry Mercer's work in *The Dating of Old Houses* (1923) and Lee Nelson's *Nail Chronology* (1963/1968). These two works represent a significant amount of historical research on the history of hand forged, machine cut, and wire nails. Both provided a detailed chronology of events that showed which nail-types were representative of a certain period in time, especially from the late eighteenth century to the present. These chronologies were used and refined by a number of authors (Benson 1980, Fontana 1965, Fontana and Greenleaf 1962, Santucci 1981, Wells 1998). In addition, some early diagrams and descriptions of nails have been used repeatedly by the above authors. One of the most prominent is the

Kimbark's catalog images found in Fontana (1965). These images have been used by other nail researchers to compare dimensions of nails found at archaeological sites (see Benson 1980). For the researcher who desires to understand how nails have changed in the past 250 years the authors mentioned above have provided a number of good chronologies based on different nail variables. Some of these include: nail manufacture, nail head manufacture and style, and dominant grain of the iron used for nail construction.

Many detailed chronologies exist for nails using the above landmarks, and as chronological indicators in old buildings as well as archaeological sites. Yet, nails have often been left out or only briefly mentioned when associated with archaeological sites. Nails are often numerous, but found in highly deteriorated condition, leading some archaeologists to note them then omit analysis because it is not considered efficient or economic (Larrabee 1968). However, despite this perceived lack of analytical value, some authors have utilized nails beyond chronology, as cultural and structural indicators at a site.

For example, some authors have utilized nails as a means of determining the timing of alterations for structures such as houses in addition to the location of different parts of the structure such as walls, roofs, cabinets, furniture, and the like. Examples include Bacon (1998), Carlson (1996), and Ruple (1986). All of these authors use the placement and the nail-type to identify structural features located in areas of a site. Carlson (1996) identified the possible location of walls and a roof collapse using the distribution of different nail sizes in the Commanding Officer's Quarters at Fort Atkinson State Historical Park in Nebraska. Bacon (1998) and Ruple (1986) also made some similar inferences based on

the nails at Fort Robinson (Crawford, Nebraska) and Fort Randall (South Dakota), respectively.

Finally, some researchers have attempted to move even further beyond simple use of nails as chronological and structural indicators. Benson (1980) and Larrabee (1967) have proposed other methods. Benson, using the Kimbark's Catalog mentioned above, argued for the construction of nail 'types' similar to those found in lithic typologies. These types would be determined by the length and width measurements taken from to-scale nail images in the Kimbark's Catalog. Certain combinations of length and width would correspond to certain pennyweights. When compared with data from an actual site, Benson's types showed some variation in nail sizes and argued that they could be used to trace the nails to particular manufacturing centers. Larrabee, using a series of nails from a War of 1812 site at Sackets Harbor, New York, attempted to do something similar. Arguing that nails were typically found in such poor condition that chronologies and guides like those of Nelson and Mercer could be relatively useless, Larrabee provided detailed drawings and descriptions of nails found at the site as 'type specimens'. He identified types such as "side-pinched", 'cast', 'block head', etc. Although his work was preliminary in nature, Larrabee did point out the idea that the main chronologies, usually intended for standing houses, are often difficult to use with nails that are heavily corroded. His types did not seem to take hold in the archaeological literature.

Today, the chronologies provided by Mercer (1923), Nelson (1968), and Wells (1998) have seen the most use. In addition, the detailed study of nails is still difficult to find in the literature, as most of the major nail literature is in the form of conference reports, site reports, and other gray literature that is difficult to obtain. Other parts of it are included in

publications on specific sites (see Fontana and Greenleaf 1962) or in the form of patent histories and other historical documents used as background in the chronologies mentioned above. However, despite the difficulty in finding literature focusing on the study of nails, the current body is adequate for comparative purposes in this thesis. The chronologies provided by Mercer and Nelson provide a basic means to analyze the nails at BC. In addition, although it is difficult to use all of the morphological criteria used in these works to identify nails that have been distorted and corroded by over a century in the ground, the nails recovered by the UNL field school students during the 2005 and 2006 seasons will prove useful in providing evidence that the eastern excavation site at BC is consistent with the photographs of the Roland Reed ranch.

### **2005 Nail Description**

Under the direction of Dr. Paul A. Demers, Nolan Johnson and Tristan J. Harrenstein (Demers, Dempsey, and Johnson 2006) conducted the analysis of the nails recovered from BC in the 2005 field season. This study, recorded a number of data points for each nail. They are as follows: The provenience, including test unit, level, and the area or feature associated with the unit. Further, the quantity of nails found in each provenience was recorded, with similar nails grouped together, as well as the length of whole nails or their designation as fragments. Length measurements were recorded using discrete categories based on standard nail sizes in inches for whole nails. Fragmentary nails were simply designated with a capital “F” Another variable recorded was the method of manufacture, including machine-cut, hand-made, and wire-cut as well as specialty fasteners such as shoeing nails, boot nails, brads, rivets, screws, small brads, staples, tacks, tines, and five categories for uncertain designations such as “bolt (?)” or “nail (?)”.

Researchers applied “N/A” for the remaining uncertain designations. The head form category was extremely difficult to interpret due to the condition of the nails, and this difficulty can be seen in the existence of over forty categories for this one variable. Some were grouped under larger categories like machined or hand-made, but many had observations such as ‘rust’, ‘rose head’, ‘modified’, ‘triangular’, ‘partial’, ‘round’, ‘mushroom-shaped’, and many others. This category would prove problematic when merging the 2005 and 2006 data. Another determination was whether each nail was bent or straight, with any degree of bending on the nail leading to a classification of bent. The heated context of the nail indicated whether it was found in a feature or unit that had heating evidence in the form of charcoal, ash, other burned artifacts, or the bright-red/orange hue that occurs when iron oxides undergo heating. In general, heated nails are well-preserved.

While most of the variables above proved useful in describing the nail assemblage from 2005 and obtaining some insights into their placement and character at the site (see Demers, Dempsey, and Johnson 2006), the head data was more variable and too inclusive for this study. However, data on location (unit and level), length, method of manufacture, bent or straight status, and heated context were useful. These aided in determining the edges of the building at the site, the type of wooden building materials used, the association of nails with possible burn pits, and evidence of salvage at Beaver Crossing. The high number of fragmentary and bent nails and their location being was highly indicative of salvage. Also, since the vast majority of nails were machine-cut with machined heads, common by the 1830s, the date of 1861-1872 for the site is supported. Both the 2005 site report (Demers, Dempsey, and Johnson 2006) and Johnson (2006)

utilized the nail data from 2005. With that in mind, many of the variables mentioned here were carried over into the 2006 nail analysis.

### **2006 Nail Analysis**

Also under the direction of Paul Demers, the nails collected in 2006 BC excavations were analyzed by a group of students in the spring 2009 Historical Material Culture course (ANTH 487/887E) at UNL (Amrine et al. 2009). The variables used in this study and changes from 2005 are as follows: 1) the *catalog #* was recorded again, showing where each nail was stored in the site collection; 2) and 3) the *unit* and *level* were also recorded as in 2005; 4) the *area/feature* category was eliminated in 2006 because there were no major features associated with the excavation units dug that year; 5) the *quantity* category was eliminated since similar nails were *not* grouped together in 2009; 6) the *length* of whole nails and the status of some nails as *fragments* was recorded. In the 2009 analysis, the length was initially recorded as a continuous variable in inches to the hundredth of an inch. Nails designated as fragments were those missing any portion of the whole. In addition, fasteners or metal fragments found that were not building nails, such as screws, were not measured for length and given a designation of N/A; 7) the *type of manufacture* for each nail included the categories of machine-cut nail, hand-made nail, wire-cut nail, shoeing nail, boot nail, brad, rivet, screw, small brad, staple, tack, tine, and an N/A category for unidentified metal fragments. Uncertain designations in the 2009 analysis were simply included in the N/A category to save time and avoid ambiguity; 8) *head form* was simplified significantly for the 2009 analysis. The categories used were hand-made head, machined head, machine-cast head, and N/A for nails without heads or with unidentifiable heads. This allowed for much faster analysis of the nails and served to



eliminate ambiguity caused by heads that were wholly unidentifiable; 9) with the *bent/straight* category, researchers added more detail for this variable with the addition of a category of *slightly bent* for nails bent at an angle of less than 45°; 10) although *heated context* was considered in the 2009 analysis, none of the nails recovered in 2006 showed any evidence of heating or being associated with a heated feature. Hence, this category was essentially non-existent for the 2009 study.

Prior to the 2009 study of the nails found in 2006, Nolan Johnson made a basic count of nails according to level and unit. However, no other study had been made on these nails by 2009. The 2009 study, building off the nail analysis from 2005, was intended to be more streamlined in order to analyze over 700 nails in the time available. The variables chosen proved to be simple to record and provided for quick analysis of the entire 2006 nail assemblage. Some of the changes above were implemented for this thesis. For example, the use of continuous measurements for the length of whole nails rather than discrete categories showing standard lengths would allow for greater ease in the statistical analysis of the whole nails. In addition, measurements in inches made it easy to convert back to discrete variables if needed. Also, simplifying the head data was advisable since the manufacture of the nails was sufficient to confirm the 1862-1871 data for the site. Although head type can sometimes provide more chronological data if enough nails with a certain head-type exist, that was not necessary at this site or for this thesis, which focuses on the structural data that can be taken from a study of the nails. Finally, the *bent slightly* category was added to determine a possible difference between nails that were being removed for salvage, and bent heavily in the process, or simply bent

slightly while still in the wood as boards, shingles, and siding were pulled off the structure.

### **Merging the Data**

After the completion of the 2009 analysis of the nails from 2006, and a brief contribution to the 2006 site report (Amrine et al. 2009), the next step was to join the data from 2005 and 2006 in order to have a data set that covered the entire site. In order to accomplish this, certain variables had to be altered, and columns of data were added in order to prepare the nail data for analysis. The changes are as follows: 1) the *quantity* category from 2005 was expanded in order to consider each nail individually and allow for easy calculation through computer programs such as Microsoft Excel. Nails from 2005 that had been grouped together and given a quantity greater than one were copied and re-entered as individual nail entries; 2) the *length/fragment* data was copied into two new columns. One column was designed to merge the discrete 2005 nail data and the continuous 2006 data into a continuous range of whole nail length that rounded to the nearest standard nail size category. For example, a designation of 1 1/8" from 2005 was converted to 1.00 inches. In general, numbers within .13 of the standard nail length in decimal format (1.00, 1.25, etc.) were rounded to that number. This made a column that is both discrete and continuous at the same time. Nail categories using .25" or whole number designations were present, but the data could also be interpreted as continuous by Microsoft Excel. A second column was made by converting the column with rounded, measured nail length into discrete pennyweight categories (2d, 3d, 4d, etc.). This was done using the chart cited in the 2005 site report (Demers, Dempsey, and Johnson 2006: 105). This column was made so that pennyweight data could be fed easily into GIS,

allowing spatial distributions of nail sizes across the site to be examined; 3) the *manufacture type* data from 2005 was translated into the same format as the 2006 nail data, with designations such as “nail (?)” included in the N/A category; 4) as accurately as was possible, the highly variable *head form* data from 2005 was converted to match the designations in the 2006 data. The original 2005 data was kept for a reference. Due to the difficulty in interpreting the numerous categories from 2005, however, the head form data will not be used extensively in this thesis; 5) for the *bent or straight* variable, the category used in the 2006 data called *bent slightly* was simply joined into the bent category to prevent confusion and allow a uniform data set between 2005 and 2006. In addition, it was determined that the *bent slightly* category, defined by those nails bent at an angle less than 45°, was still too broad to provide much distinction between nails being pulled out of the wood or simply bent when the wood was removed.

No other major changes were made in order to merge the data from the 2005 and 2006 nail assemblages. The goal of this step in the process was to make a data set that would lend itself to multiple modes of study, including descriptive statistics and more detailed statistics, whole nail length, as the only continuous category in the data, and in spatial analysis of the site by unit. It is hoped that this data, which will be saved and made available for future researchers of this site, will be used for future reference and research at BC beyond this thesis.

### **Using GIS and Expectations for This Study**

Geographic Information Systems (GIS) Software provides an excellent means whereby structural evidence provided by the nail assemblage at BC can be examined. Often used for making maps of sites and analyzing spatial data, the GIS programs

available are ideal for the study in this thesis because they allow a researcher to quickly view spatial data across a site in order to see patterns. GIS was used heavily in both the 2005 site report and Johnson's thesis (2006). This thesis will build upon these GIS applications.

In this thesis, only the nails classified under the manufacture type of machine-cut nails have been included for use in GIS. This decision was made based on the relatively small number of other fasteners and nail-types in addition to uncertainties that exist about nails that were originally designated as hand-made. Using a basic map of the excavation units at the site, the distribution of straight whole nails, whole nails of specific pennyweights that have been chosen because the number of nails within each category is over fifteen (2d, 3d, 4d, 5d, 6d, 8d, and 10d), bent whole nails, and fragmentary nails will be overlaid across the excavation map in order to bring out any additional structural information beyond what has been stated in previous publications. This will be accomplished using ArcGIS 9 and should reveal additional structural patterns at the site. It is hoped that, through this analysis, the evidence will show that the structural data gained from the nails a BC is consistent with the photographs of the Roland Reed Ranch house.

### **Chapter 3: Structural Evidence Provided by the Nails at Beaver Crossing**

This chapter focuses on the nail data from Beaver Crossing in its entirety and assesses the structural insights that can be gained from that data. First, the chapter discusses the material expectations for the nails at the site, discussing what patterns should or should not be present. This will also include a discussion on some of the assumptions that have been accepted when interpreting the nails at Beaver Crossing. Second, the chapter will provide a discussion of the nail data itself, describing what is present. This will focus on a summary of the machine-cut nails found at the site, with general trends in nail size, fragmentary nails, and those that are bent or straight. Third, the spatial analysis of the nails at BC from 2005 and 2006 are discussed, showing the results. Nails of a number of pennyweights will be examined in addition to the distribution of whole nails, fragmentary nails, straight nails, and bent nails. Finally, the results of the spatial analysis is discussed and evaluated and it is shown that the structural data gained from the BC nails is consistent with photographs of the Roland Reed Ranch.

#### **Assumptions and Material Expectations**

##### *Assumptions*

While the nails at Beaver Crossing are discussed, a major assumption must be addressed. This assumption is the association between nail size and function. As has been mentioned in Chapter 2, this thesis utilizes the standard pennyweight system for nail size since it is simple, straightforward, and, for the most part, agreed upon in the literature (Fontana 1965, Fontana and Greenleaf 1962, Mercer 1923, Nelson 1968). In short, each

pennyweight designation, such as 2d, 4d, etc., is associated with a specific nail length in inches. Table 1 illustrates this concept.

**Table1.** Nail size in inches by pennyweight.

<b>Pennyweight(d)</b>	<b>Size (inches)</b>
2d	1.0"
3d	1.25"
4d	1.50"
5d	1.75"
6d	2.0"
7d	2.25"
8d	2.50"
9d	2.75"
10d	3.0"
12d	3.25"
16d	3.50"
20d	4.0"

Since this system has been used heavily by those who study nails, there have also been many attempts to associate nail size with a specific function. A number of authors have attempted to do this, including Crouch (1978), Fontana and Greenleaf (1962), Lees (1986), and Walker (1971). These authors are summarized in Lees (1986), who points out how difficult it is to assume that a certain nail size is associated with a specific function. His work involves the attempt to arrange nail sizes with their use-context in standing

buildings. For the purpose of this thesis, the findings of all of these authors have been pulled together into one table to show *intended* function according to nails size. Table 2 shows these associations.

**Table 2.** Intended nail function by pennyweight. Compiled from Lees (1986).

Pennyweight (d)	Intended Function
2d	wall and ceiling lath, fastening wooden shingles to roof sheathing
3d	wall and ceiling lath, shingling, thin tongue and groove paneling
4d	shingling, slating, cabinet work, moulding, interior finish, clapboard siding
5d	moulding, finish work, ornamentation, light framing of 1-1.75" boards
6d	clapboarding, light framing, bevel siding, wood grounds, shingling, exterior trim, flooring, finish
7d	<i>*interestingly, no authors have discussed 7d nails</i>
8d	finish, flooring, furring strips, wood grounds, interior fittings, sheathing, boarding, exterior trim
9d	flooring, boarding
10d	boarding, furring strips, flooring, interior fittings, pillars, roof of veranda, sheathing, door and window framing, window trim, weatherboarding, wainscoting, stairs, washboards
12d	wooden studding
16d	wooden studding, rafters, heavy framing
20d	very heavy framing, framing of joists and roofs, sheathing, planking walks, heavy flooring

The reader should notice a pattern in that most nail sizes functionally served different purposes depending on the situation. Another important consideration is that those who use nails, both past and present, are often limited to what they have available.

Archaeologically, this can obscure functional interpretations since they could be used for many different purposes. This is especially true for the smaller nail sizes (2d to 8d).

People did not always use nails according to the intended function, and archaeologists must realize this when making interpretations. This thesis will utilize the table above with this in mind.

#### *Material Expectations Based on the Photographs of the Roland Reed Ranch*

Figures 7 and 8, placed below, show the Roland Reed ranch as it was in 1866. Figure 9 is the excavation map of the site with an outline of the log house. Material expectations based on these images are discussed in this chapter. Since this study focuses on structural implications of the nails at the site, only the structural elements of the house that are present in the photograph are discussed.

According to Demers (in press), the log house has been classified as a front-gabled, pre-classical box style (see McAlester and McAlester 1987). The house, as shown in the photographs, is a one and a half-story building with what may be a framed attic or sleeping loft. According to evidence taken from the archaeological excavations, the house measures an estimated 36x24 feet. This was a standard size for the time period (Demers in press). Also apparent in the photograph is siding along the front gable of the upper half-story, a shingled roof, two heavily framed windows on either side of the front door that are especially visible in Figure 10, and a thinly framed front door. Coming off at an angle from the house is an ell, or a structural wing supported up upright wooden poles, boards, and covered by a sod roof. No evidence of this ell was found in the excavation of the site. The rest of the house is apparently constructed of roughly cut, irregular, squared off logs with daub.

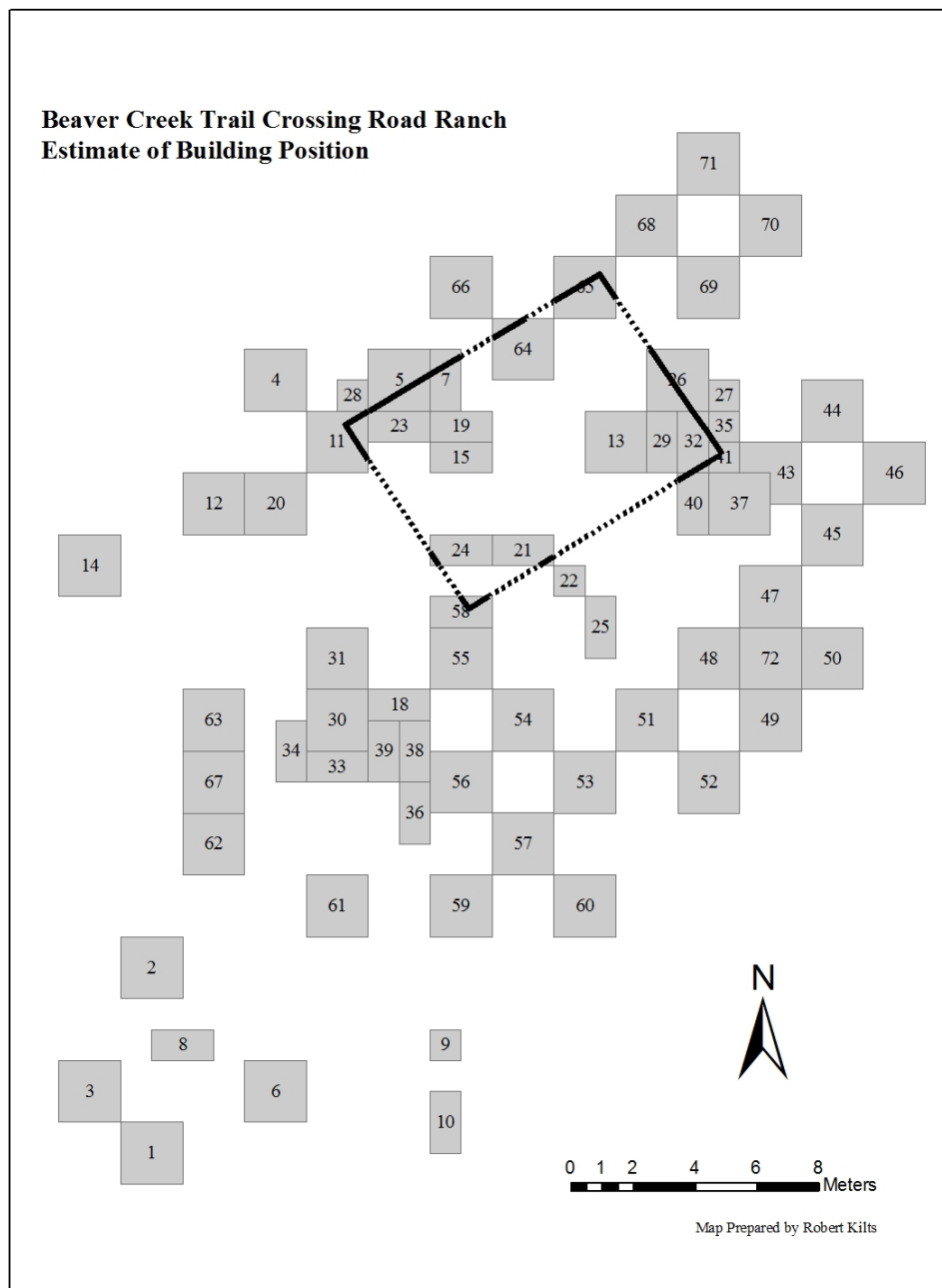




**Figure 7.** Cropped photograph of the Reed Ranch House at Beaver Crossing (1866)  
(Courtesy of Nebraska State Historical Society RG2469-05)



**Figure 8.** Cropped photograph of the Reed Ranch with the Well and Ells (Courtesy of  
Nebraska State Historical Society R-629-4).



**Figure 9.** Site map showing placement of units and the estimated location of log house (Demers in press).



**Figure 10.** Close view of house façade from photograph in Figure 8.

Log houses, in general, rely on the logs and daub for the majority of their structure. However, there are elements in such a structure that require nails. Since the photographs do not show the inside of the house, this thesis will mainly discuss nails that may have a bearing on those structural features seen on the outside of the house. Some interpretation may be made about flooring and other features existing inside the house, but that involves significant speculation and does not address the question of whether the nails at this site are consistent with the two photographs above.

The upper story of the house would have been expected to provide a majority of the nails found later at the site. It appears to have a frame structure, wooden siding, and wooden shingles, all of which require nails to fasten them together and to the rest of the house. In addition, the small window frame located in the front gable of the house would also require nails to hold it together. As can be seen from Table 2, shingling of the roof and thin siding fall within nail sizes from 2d to 6d, or nails of 1-2" in length. This makes

sense, since these sizes of nails can be used for multiple purposes and were likely more available for use. Thus, they were used for any sort of work that did not involve extremely thick wood. According to this, the data at this site should be heavy in the direction of these smaller nails. Also, it would be expected that these nails would be scattered across the site spatially since the roof and upper story represent such a major part of the structure. Since the structure at BC was salvaged, it is also likely that, despite their scattering, these nails would be concentrated in locations where shingles, siding, and other materials were piled as the building was taken apart. This may have been near the corners of the house as it was dismantled and parts of it were laid in piles.

The windows on the house and their associated frames, as mentioned above, would also provide a small source of nails. The door frame could also be considered in this discussion. In Figure 10, the windows on the first story on either side of the door have thick framing boards, especially on the top and bottom portions of the window frame. The door itself seems relatively thin. The window on the upper half-story, since it is smaller, also appears to have thinner frames. Nail sizes associated with these door and window frames are likely to be within the range of 6d to 10d, since 12d nails and above are generally used for very heavy framing. These frames would likely leave a smaller set of nails behind, but would add to the number of nails in the 6d to 10d categories. The door frame and the frames of the windows on the lower floor would likely contribute nails toward the larger sizes (8d-10d). However, depending on how the windows were build, the small wooden frames in between the six window panes of the lower doors would also contribute nails of smaller size, possibly 2d or 3d. Spatially, it is expected that the contribution from these features of the house will be difficult to interpret. Due to

salvaging, it is possible that the windows were removed and the useable wood taken away from the site with the nails in it. However, these features, if dismantled near the front of the house, may have an effect on nail distribution toward the southwestern portion of the house. In addition, looking at the distribution of pane glass along with the distribution of nails may also indicate the location where the windows were dismantled and nails left behind.

The upper, sided portion of the house was also the part of the house that would have used framing in order to construct the roof and gables of the house. This sort of framing would have required a range of nail sizes that would cover medium to heavy framing in order to support the roof. According to Table 2, the nail size range for this task would have been between 8d through 20d, with the upper nails sizes being used for roof jointing and framing. In addition, rafters and some type of flooring may also have been present in order to make the upper half-story suitable as a sleeping loft or attic. This would have involved 16d or 20d nails for inserting and holding the rafters and nails from size 6d to 10d to provide basic flooring. From this data, we would expect an addition to the number of 6d to 10d nails located at the site. Also, there should be at least some of the nails of greater sizes (12d-20d) present. However, we must again consider the effect of salvaging. According to some experimental work done in the UNL archaeology lab at Morrill Hall, and the data gained from an excerpt from *Builder's Hardware* (anon. 1888), square cut nails from the 19<sup>th</sup> century are designed for much greater holding power. In fact, the larger the nail, the more difficult it is to remove from a piece of wood. Since a vast majority of the nails at Beaver Crossing are machine-cut nails, it is very likely that any large nails would have been taken along with useable pieces of wood by salvagers. Thus,

the spatial signature left over by the larger nails (12d-20d), will be very difficult to identify. However, they should still be present in small numbers and will likely be located near concentrations of other nails.

In addition to expectations regarding nail sizes, there are also some expectations at this site regarding bent, fragmentary, and whole nails. Nail fragments are often a common occurrence at historical archaeological sites (Lees 1986) and bent nails are also fairly common. At BC, we should see an abundance of both bent and fragmentary nails due to the process of salvaging. Although Lees suggests that numerous nail fragments may be the result of structural decay going on around the nail while it is still in place, BC is a different case because very little was left to decay. Salvagers likely took any large pieces of wood that were still useful along with the nails that they contained. However, shingles, siding, and other small pieces of wood may have been left behind along with the nails that fastened them. This would result in the presence of a number of bent nails at the site if bending occurred as a result of shingles or wood being removed quickly and cast aside. The process of removing wood from the main structure of the building would have also depended on the removal of many nails in order to unfasten useable wood from the rest of the structure. As mentioned above, machine-cut nails are very difficult to remove, and bending and breakage was likely a common result as nails were taken out. With this in mind, fragmentary and bent nails will likely be the most common type found at the site. In addition, they will probably be the most diffuse across the site as they were tossed away at removal or left in piled wood that would not be re-used. Whole nails, on the other hand, should be relatively rare as any nails that were still useful would likely have been taken along with the other salvaged goods. Thus, we should see a smaller number of

straight whole nails around the site. Their presence is difficult to explain, but they may have been left in wood that could not be re-used, accidentally discarded by builders or salvagers, especially during roof work, or discarded after removal from wood if the removal failed to damage the nail and the salvagers were careless.

From the above discussion, it can be seen that the material expectations are fairly general. This is mostly due, as mentioned above, to salvaging that occurred at the site. The process of salvaging, especially at sites like BC that have been picked clean, stirs up stratigraphy and artifact placement at sites, blurring their spatial distribution and making it difficult to see patterns (Johnson 2006). Regardless, this thesis asserts that these patterns can still be found and used to interpret the site. The following section will seek to bring these patterns to light and show that the nails at Beaver Crossing are consistent with photographs of the Roland Reed Ranch.

### **A Description of the Nails at Beaver Crossing**

A total of 1746 nails were recovered at BC from both the 2005 and 2006 field seasons. Of those, 1543 were classified as machine-cut nails. It is the machine-cut nails that will be the focus of this thesis. Tables 3-6 summarize the data for the machine-cut nails. Of the total nails, 61.7% were nail fragments that could not be identified according to size. Whole nails, both bent and straight, represented 37.91% of the assemblage. Of the whole nails 52.48% were straight while the other 47.52% were bent. As far as nail size is concerned, the percentages of whole nails are as follows: <2d-1.37%, 2d-3.25%, 3d-9.23%, 4d- 60.68%, 5d-3.59%, 6d-6.50%, 7d-0.68%, 8d-9.06%, 9d-0.34%, 10d-4.10%, 12d-0.51%, 16d-0.34%, and 20d-0.34%. Finally, of the nails recovered, 7.38 % were nails found in a “heated context” as described in Chapter 2.

**Table 3.** Machine-cut fragments and whole nails in the assemblage

<b>Number of Nail Fragments and Whole Nails in the Assemblage</b>		
<b>Type</b>	<b>Number</b>	<b>Percentage</b>
<b>N/A (Not Identified)</b>	<b>6</b>	<b>0.39</b>
<b>Fragments</b>	<b>952</b>	<b>61.70</b>
<b>Whole Nails</b>	<b>585</b>	<b>37.91</b>
<b>Total</b>	<b>1543</b>	<b>100</b>

**Table 4.** Machine-cut bent and straight whole nails in the assemblage

<b>Number of Bent and Straight Whole Nails in the Assemblage</b>		
<b>Type</b>	<b>Number</b>	<b>Percentage</b>
<b>N/A (Not Identified)</b>	<b>0</b>	<b>0.00</b>
<b>Bent Nails</b>	<b>278</b>	<b>47.52</b>
<b>Straight Nails</b>	<b>307</b>	<b>52.48</b>
<b>Total</b>	<b>585</b>	<b>100</b>

**Table 5.** Machine-cut nails in the assemblage by pennyweight

<b>Number of Whole Nails in the Assemblage by Pennyweight</b>		
<b>Pennyweight</b>	<b>Number</b>	<b>Percentage</b>
<b>&lt;2d</b>	<b>8</b>	<b>1.37</b>
<b>2d</b>	<b>19</b>	<b>3.25</b>
<b>3d</b>	<b>54</b>	<b>9.23</b>
<b>4d</b>	<b>355</b>	<b>60.68</b>
<b>5d</b>	<b>21</b>	<b>3.59</b>
<b>6d</b>	<b>38</b>	<b>6.50</b>
<b>7d</b>	<b>4</b>	<b>0.68</b>
<b>8d</b>	<b>53</b>	<b>9.06</b>
<b>9d</b>	<b>2</b>	<b>0.34</b>
<b>10d</b>	<b>24</b>	<b>4.10</b>
<b>12d</b>	<b>3</b>	<b>0.51</b>
<b>16d</b>	<b>2</b>	<b>0.34</b>
<b>20d</b>	<b>2</b>	<b>0.34</b>
<b>Total</b>	<b>585</b>	<b>100</b>



**Table 6.** Machine-cut nails found in the context of a heated feature or area during the excavation.

<b>Number of Nails and Nail Fragments in the Assemblage found in a Heated Context</b>		
<b>Type</b>	<b>Number</b>	<b>Percentage</b>
<b>No Heated Context</b>	<b>1429</b>	<b>92.61</b>
<b>Heated Context</b>	<b>114</b>	<b>7.39</b>
<b>Total</b>	<b>1543</b>	<b>100</b>

The data above show a few trends that bear discussion. For example, the number of fragmentary nails at the site is consistent with the fact that the site was heavily salvaged. In addition, the smaller number of whole nails, both bent and straight, is consistent with the same observations. Salvagers would have taken most of these or left them in the wood that was being transported elsewhere. Also of note here is the fact that the bent and straight nails do not match the material expectations for a salvaged site. Of the 585 whole nails left at the site, slightly more than 50% of these are *straight nails* while the bent nails represent slightly less than 50%. This is an interesting statistic, not only because it is somewhat inconsistent with the expectations above, but that it may also yield further insights into the way in which the site was salvaged. It indicates that a number of nails were left in wood that was removed and discarded without bending of the nails. Since 87% of the straight nails in the assemblage are located within the <2d to 6d size range, it is likely that this is the case. Some of these straight nails may have also been dropped or discarded during construction and salvaging activities at the site. Bent nails at the site were probably those initially removed then discarded in order to begin the process of tearing off siding or shingles.

Other results from the data description, having to do with nail size, are consistent with the photographs of the site. For example, 83% of the nails found at the site fall within the

2d to 6d nail size ranged. This is very consistent with the expectations mentioned above and shows that, indeed, the amount of shingles and siding present at the site would lead to the data being heavy on the lower end of the nail size spectrum. In fact, 4d nails represent 60.68% of the entire whole nail assemblage. According to Table 2, this size of nail could be used for shingling and a number of other purposes. At BC, this size category served multiple functions. Other important sizes in the lower range with “higher” concentrations (3d and 6d nails) were also used for both shingling and siding. This is consistent with what is seen on the upper portion of the Roland Reed House. Nail sizes used for larger projects, such as light to heavy framing, window framing, inserting rafters and joints for roofing, and flooring represent a much smaller portion of the overall assemblage at the site. For example, very heavy nails are virtually unrepresented with a total of seven nails in the assemblage of whole nails (1.2 %). However, nails of size 7d to 12d represent about 15 % of the whole nails. This is consistent with the photographs of the site because these nails would have been used for window framing, flooring of the upper story, and other forms of light to medium framing. All of these structural features can be inferred from the photographs. Thus, although not as frequent as the smaller nails, they are still present. The smaller number of these nail sizes is also consistent with the fact that very large rafters, framing boards, etc. would probably have been salvaged with nails left in them or taken along if removed and still useable. Bent nails were likely discarded.

### **Spatial Patterns from the Nails at Beaver Crossing**

As was mentioned in Chapter 2, a number of nail categories will be examined using GIS methods. These categories are: the total distribution of nails across the site, the distribution of nail fragments, the distribution of straight whole nails, the distribution of bent whole nails, and the distribution of a number of both bent and straight whole nails by pennyweight. The whole nail pennyweights that will be examined were chosen because they are represented by more than ten nails. Those with smaller numbers would yield little for interpretation and will not be examined here. The sizes to be examined are :2d, 3d, 4d, 5d, 6d, 8d, and 10d. This section of Chapter 3 will treat each of the categories mentioned above in order and will provide interpretation along with them.

The following figures follow the same convention, showing the test units located over the rectangular mound at BC. Each unit is marked with its number then shaded to represent the number of nails or nail fragments located in each unit. Darker shading indicates more nails while lighter shading indicates fewer nails. In addition, each figure shows a rectangle illustrating the location of the log house as estimated in Demers (in press). The order in which each category will be shown and discussed is as follows: machine-cut nails and fragments, machine-cut fragments only, straight whole nails, bent whole nails, 2d nails, 3d nails, 4d nails, 5d nails, 6d nails, 8d nails, and 10d nails. Each distribution will be discussed and possible interpretations put forward.

#### *Distribution of All Machine-Cut Nails and Fragments at the Site*

Figure 11 shows the distribution of the total nails and nail fragments across the site. It presents a number of high nail and nail fragment concentrations across the site. In fact, the nails seem to be ubiquitous throughout the site with the exception of units 3, 6, 7, 10

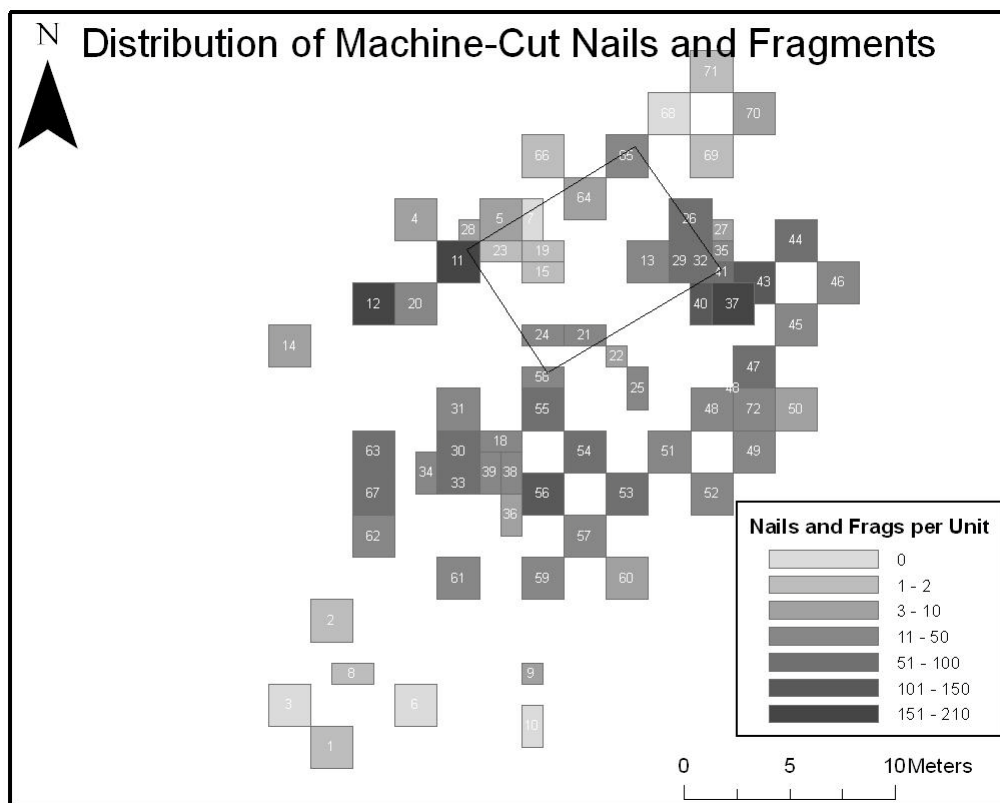
and 68. All four corners of the proposed house location sport high concentrations of nails on or around them, though the SW corner has a greater concentration to the south at and around unit 56. In addition to those concentrations centered about the corners of the house, there is also a concentration at unit 12 and on the west side of the excavation at units 63 and 67. The greatest concentrations of nails seem to form a rectangular pattern around the southeastern façade of the proposed house location. There also seems to be a slightly lower concentration of nails north of house when compared to the distributions seen to the south.

The patterns above are difficult to interpret. However, some inferences can be suggested using what is present. First, we can see that the general, rectangular shape of the house is outlined in the nail concentrations, although it is somewhat “fuzzy”, following only a general rectangular shape. It should be noted that excavation bias plays some role in the distribution of test pits, and, thus the general rectangular pattern of the entire site. However, the greatest numbers of nails seem to be concentrated around the corners and facades of proposed location of the house. This pattern firmly indicates an area of nail deposition that roughly mimics the house’s proposed shape. The greatest concentrations likely represent locations in which building materials were piled and others cast aside during the salvaging of the house. Nails may have fallen from the wood, been cast aside to make transport of wood safer, or simply discarded during the process of dismantling (Johnson 2006). In addition, the higher concentration of nails to the south of the site is consistent with the findings of Demers (in press), who argued that dismantling activities occurred in a north to south direction. Mortar found at the site was

deeper in the north and shallower in the south, indicating that beams from the house were pulled out toward the south.

Outside of the greatest concentrations are a number of smaller concentrations around the site. They may also indicate activity areas or places in which materials were discarded. For example, unit 12 was determined to be a trash pit that was used during the occupation of house and was probably used during salvaging as well. Wood shingles and siding that were replaced or no longer useable could have been discarded here, leaving a large concentration of nails behind in the multiple layers of the unit (Demers, Dempsey, and Johnson 2006). Units 63, 67, and 70 in the northwest, all of which bear larger concentrations of nails and fragments, may also indicate activity areas in which wood was piled during salvaging or discarded along with bent and broken nails. Finally, the large concentrations of nails along the southeast façade of the house could indicate a place in which nails were thrown out of the way during construction and dismantling of the house. This would have avoided injury to those walking near the house as construction or salvaging activities occurred.

The general, rectangular shape to the concentrations of nails in this figure, along with the abundance of seeming activity areas, belies the general shape of rectangular structure and shows evidence of dismantling activities around the house. This is consistent with the photographs of the rectangular Roland Reed log house and the history of salvage at the site.



**Figure 11.** The distribution of all machine-cut nails and fragments located at the site.

#### *Distribution of Nail Fragments at the Site*

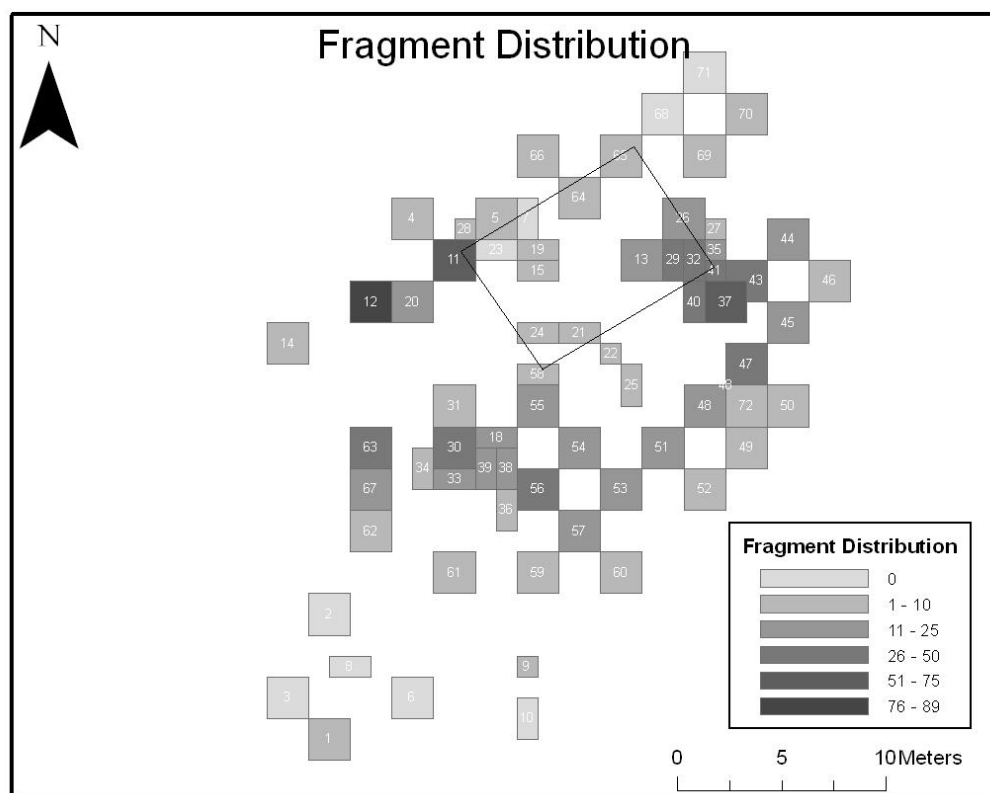
Upon examination of the distribution of nail fragments (Figure 12) across the site, it is apparent that they heavily affect the distribution above showing both fragments and machine-cut nails (Figure 11). For example, many of the main concentrations are similar to Figure 11, with the greatest being located at the four corners of the proposed house site, at unit 12, unit 56, and along the southeast façade of the proposed location of the structure. The only exception is the slightly greater number of units without nail fragments, including units 2, 3, 6, 7, 10, 23, 68, and 71. The fragments are still nearly ubiquitous to the entire excavation area.

The distribution above is so similar to Figure 11 that the fragments, which make up 61.7 % of the entire machine-cut nail assemblage at BC, help to shape the overall pattern of nails at the site. These fragments are in locations that follow the general outline of the proposed structure, making a roughly rectangular shape with their greatest concentrations. In addition, they are indicative of activity areas where broken and useless wood and nails would have been left to deteriorate while better materials were removed. As mentioned in the expectations, breakage can occur as old wood is left to rot, and the nails left to rust in-situ. Discarded siding and shingles may have provided some of these fragments as these smaller pieces of structural material break or are unusable after removal. However, in this case, due to the broad distribution of fragments, these nail parts were likely discarded after being broken during the dismantling of the log house or fell from wood that was being piled areas indicated by the greatest concentrations of fragments.

The concentrations of fragments that are outside the main rectangular patterns, but still prominent at the site, such as units 12, 63, 67, and the swath of concentrations along the southeast façade of the structure indicate other areas in which activities occurred. Unit 12 is a trash dump, 63 and 67 are probably another salvaging activity area or piling station, and the swath is likely the result of fragments being cast away from the structure during building, repair, or dismantling activities.

Like the distributions of nails and fragments at BC, the distribution shown in Figure 12 is roughly consistent with the photograph of the site in that they mimic a rectangular structure similar to the Roland Reed log house. In addition, the presence of so many fragments is consistent with the history of salvage at the site, as are the distributions

indicating areas in which large numbers of fragments are concentrated. These concentrations, like those in Figure 11, probably indicate areas in which structural material in the process of being salvaged were piled. Good material, before removal, may also have been mingled with waste material (unusable wood and nail fragments) at these activity areas.



**Figure 12.** The distribution of nail fragments across the site.

#### *Distribution of Straight Whole Nails at the Site*

Figure 13 shows the concentrations of straight whole nails across the site. The highest concentrations of nails are located at Units 63 and 67 and at the southeast corner of the house location. Other, smaller distributions of straight nails can be seen at unit 12, unit 11, around unit 56, and around unit 72. There is also a consistent concentration of nails



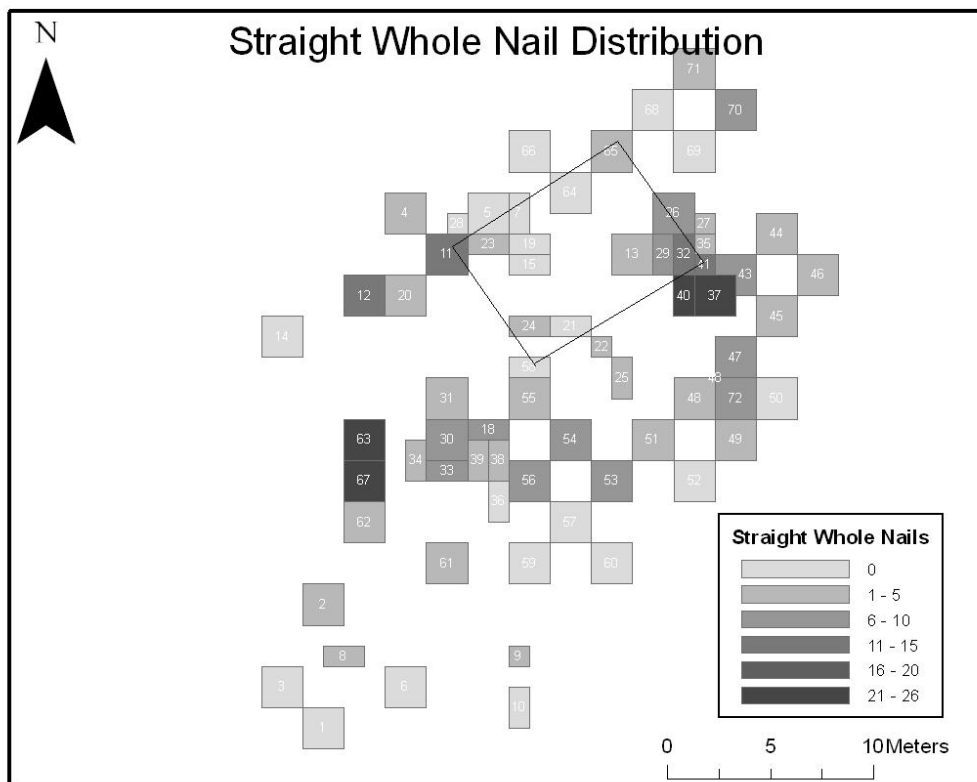
along the southeast façade of the house location that is rectangular in shape. This is similar to the pattern seen in the distributions above.

The material expectations for the site argue that straight whole nails should not be very abundant or wide-spread. However, low to medium concentrations of these nails are located in almost every excavation unit, with two or three prominent areas being more concentrated than the rest (units 63 and 67 and those around the southeast corner). These nails can result from a number of situations. First, they could have been dropped during construction or repair efforts at the site and never used. Second, they may have been left behind with wood that was no longer useable and cast aside with straight nails still in it. Finally, they may also have been removed carefully, but then discarded or dropped accidentally. Regardless of the reason, their presence shows that the salvagers here at the site may have removed structural materials hastily and only taken the remains that were the most useful. The large concentrations at units 63 and 67 and at the southeast corner of the house may represent areas in which nails were removed or dropped in abundance as structural materials were salvaged and prepared for transportation. Although straight nails would have been reused, they may have been left behind as oversight or in the interest of time. It is unlikely that those dismantling the house would have spent large amounts of time recovering every useful nail, especially if most of them are small shingling or siding nails left in shingles or siding boards that were broken or not reused. This has been shown to be the case in the data description of the nail assemblage above.

The less concentrated areas in this distribution, such as those around units 56 and 72 are also a part of the rectangular swath of nail concentrations that reflects the shape of the house. As mentioned above, this may have been in an area where nails that were removed

were discarded far from the main activity areas to get them out from underfoot of workers. In addition, the concentration of straight nails around units 56, 72, and others were likely places in which wood was being piled, discarded, or both. Some nails in these piles would have been overlooked and left behind with others left in unsalvageable pieces of wood.

Overall, the distribution of straight nails also seems to be consistent with photographs of the Roland Reed house. There is a significant amount of wood material shown in the photo that if removed, discarded, and left behind to rot, would have yielded straight whole nails. The overall rectangular pattern of nail concentrations that surrounds the house site also is consistent with the photos. Finally, the number of distinct, high concentrations is consistent with areas where wood and materials may have discarded, piled, or both are consistent with other evidence of salvage at the site.



**Figure 13.** The distribution of straight whole nails across the site.

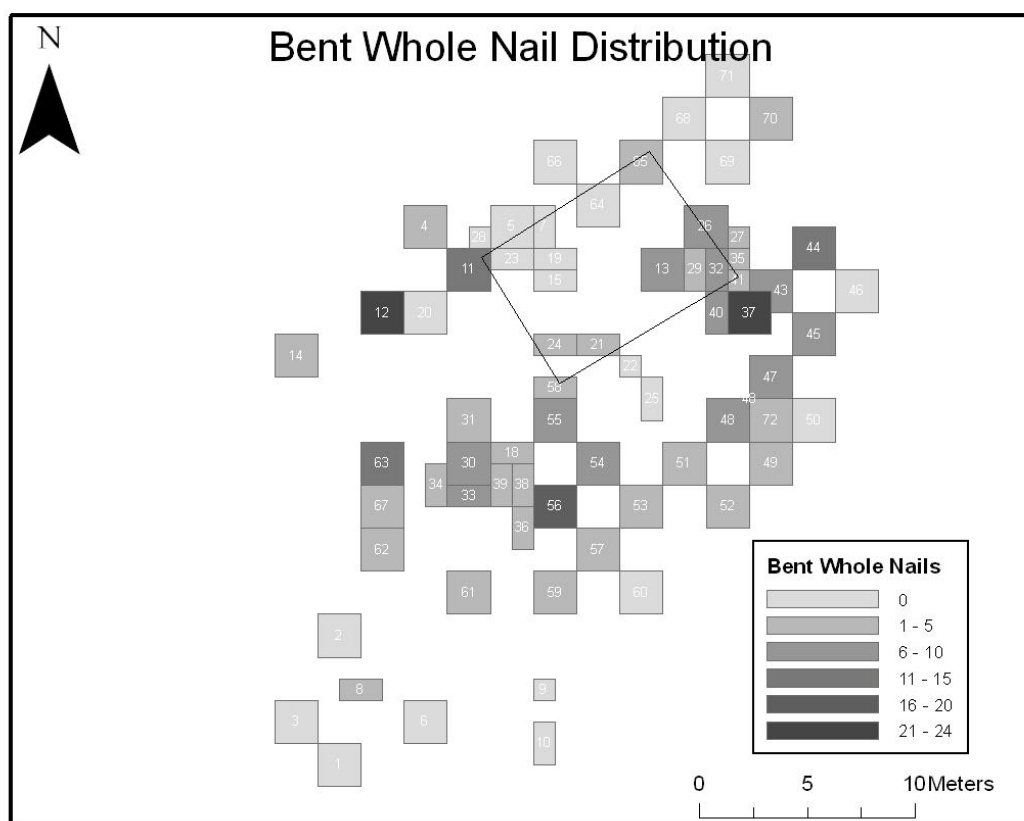
*Distribution of Bent Whole Nails at the Site*

The greatest concentrations of bent whole nails at the site are located at and around the southeast corner of the proposed house location, around unit 56, at unit 63, unit 11, and unit 12 (Figure 14). There are also smaller, pronounced concentrations around these areas and, again, in a roughly rectangular shape around the southeast façade of the house location. In addition, bent nails are also widespread across the site.

The expectation for this nail distribution states that bent nails should be numerous and widespread across the site. In addition, they should, to some degree, follow the same patterns as the nail fragments. This is, indeed, the case. The largest concentrations of bent whole nails correspond geographically to the largest concentrations of fragments at the site. For example, in both distributions, there is a strong concentration at unit 12, around unit 56, and at the southeast corner of the site. This makes sense because bent nails, like fragmentary nails, are usually the result of nail removal, although nails can sometimes bend or break in-situ when wooden structures collapse. Since this structure was salvaged, allowing no collapse to occur, the bent nails probably exclusively the result of wood removal, nail removal, and discard. The presence of bent nails in great concentrations would mark an area as a discard and wood piling site as well, with more emphasis on discard. Wood that was still useable would probably have the bent nails removed for safety and discarded (Johnson 2006). This is consistent with unit 12 as a refuse area, having a high concentration of both fragments and bent nails. The areas around unit 56 and around the southeast corner of the house were probably wood piling stations and discard areas.

Like most of the distributions, the large, rectangular swath of bent nails that reflects the proposed shape of the log house is also present. Bent nails, like nail fragments and some straight nails, would have been thrown out from under foot during building and dismantling of the house, resulting in the “halo” of bent, straight, and fragmentary nails that we have seen so far.

The bent whole nail pattern is also consistent with photos of the Roland Reed house. Again, it follows a roughly rectangular shape, the nails are widely-distributed across the site, and they seem to be concentrated in the same locations as the nail fragments. This meets the expectations outlined above and provides evidence that there was a large rectangular structure at the excavation site. It is also consistent with the other evidence of salvage found at the site.



**Figure 14.** Distribution of bent whole nails at the site.

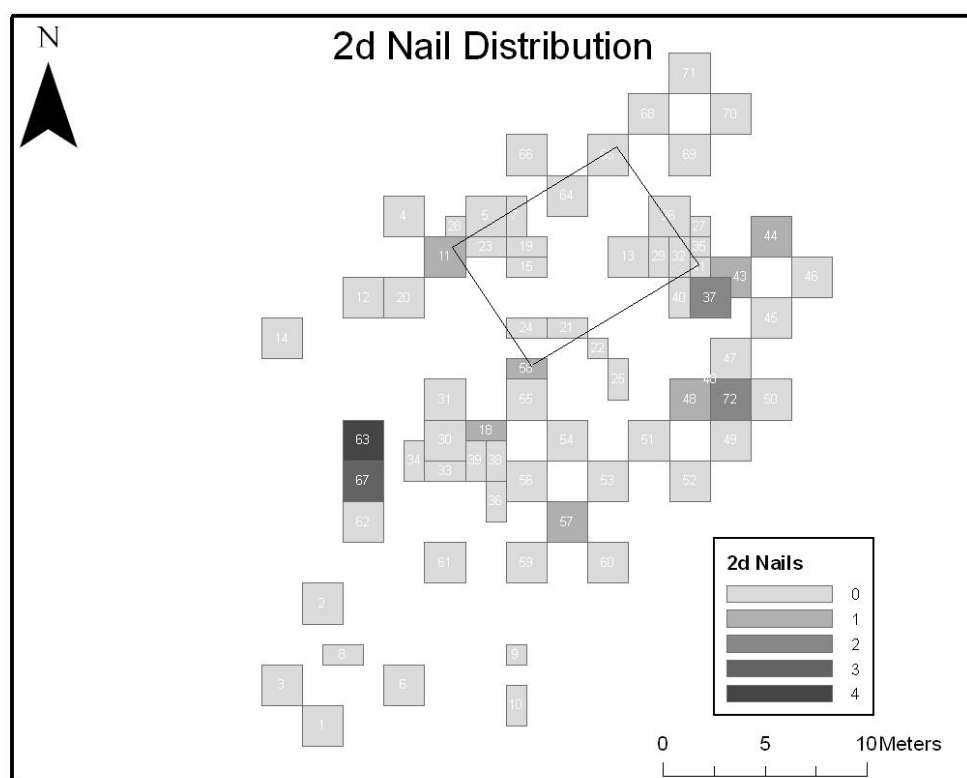
### *Distribution of 2d Nails at the Site*

Whole nails of specific sizes are useful in this thesis in that they can provide the greatest insight into the structural parts of the building that once existed at the BC site. Although nail pennyweights cannot be interpreted as being used for one purpose only, they still provide a general idea of what was used at the site. The distribution for 2d nails (Figure 15), though small, reveals some patterns. First, the greatest concentration of 2d nails is around units 63 and 67. Relative to the rest of the distribution, these two units contain the highest concentration of nails. There are two other small concentrations as well. One located near the southeast corner of the proposed house site, and another just south of that at unit 72.

Table 2 shows that 2d nails were generally used for wall and ceiling lath and the fastening of wooden shingles to a roof. In the case of this house, wooden shingles were used prominently, and 2d should be present. They may have also been used for light window frames and, possibly, furniture. Since the concentrations of these nails are small in comparison to some of the others in this thesis, they may have been used at this structure for reasons other than shingling. It is also unlikely that this size of nails was removed and re-used by salvagers. Recovering such small nails would have been time-consuming work. If they were associated with window construction, however, they would have left a smaller imprint and they should also be associated with pane glass at the site. Indeed, that is the case. According to Johnson (2006: 113-115) there a number of large concentrations of pane glass at the site. One of these is located at unit 63, which corresponds with the 2d concentration above. During salvage, the windows at the front of

the house, seen in Figure 10, may have been broken and cast aside. Nails that were with them may also have been left behind. The other, smaller concentrations near the southeast corner of the house are also located in areas where pane glass was also concentrated in greater numbers. It is likely that these 2d nails were from windows broken and discarded during the salvaging process.

The association of 2d nails at this site with pane glass in the same areas shows that the nails left behind were probably associated with broken windows from the house. This is consistent with the photograph of the Roland Reed house because the house, as shown in Figure 10, had three multi-paned windows on its front façade and may have had more on the opposite façade. The presence and locations of the largest 2d nail concentrations corresponds roughly with the general locations of these windows. It should be noted that single 2d nails are also scattered at various locations in the site, including three of the house corners. These may have been roofing nails, which is also consistent with the 1866 photograph.



**Figure 15.** The distribution of 2d nails across the site.

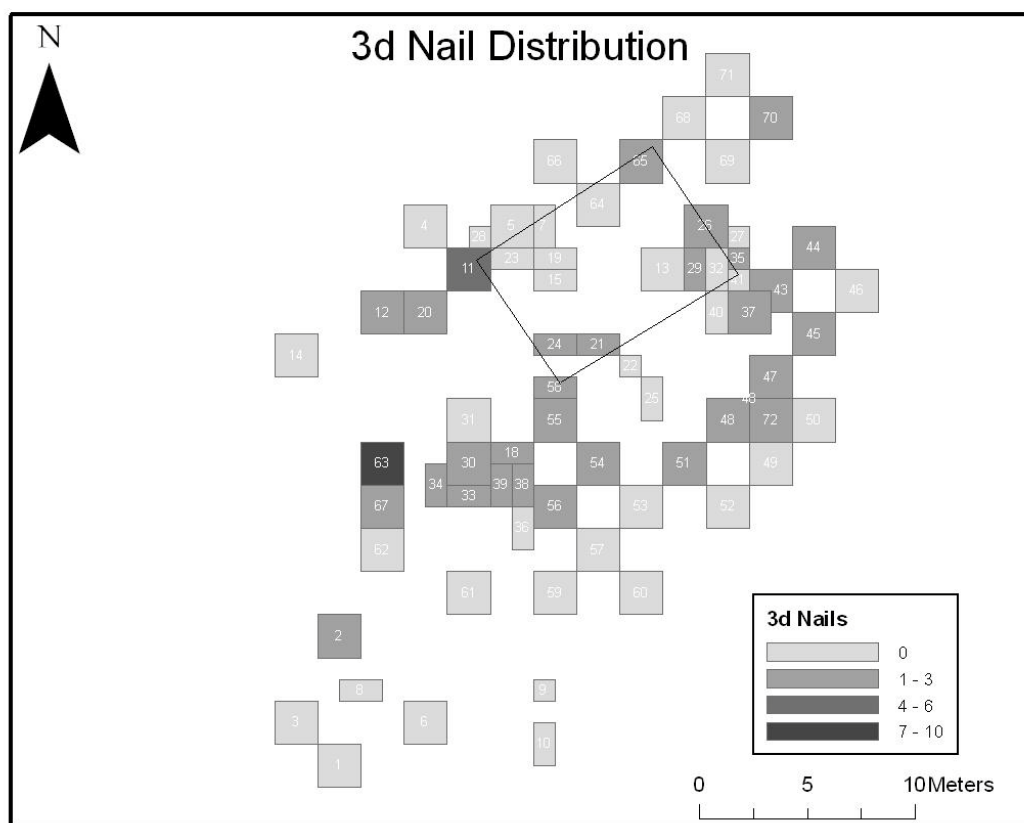
### *Distribution of 3d Nails at the Site*

The 3d nails, shown in Figure 16, are scattered more widely and in greater abundance than the 2d nails at the site. The greatest concentrations of are located at unit 63, where the most nails are found, followed by unit 11 at the northwest corner of the house. The rest of the nails are evenly distributed in a clear rectangular pattern around the southeastern façade of the house location.

In both the material expectations and in Table 2, 3d nails might have been used with wall and ceiling lath, shingling, and minor window-pane frames. The large concentration of nails at unit 63 corresponds with both the large amount of pane glass located there and the overall concentration of nails in general and straight nails at that location (see Figures 11 and 13). This means they could have either a shingling wood or window-frame

context. Concentrations of 3d nails at unit 11 and in the rectangular pattern around the southeast side of the house are likely associated with shingles as they are more abundant than is warranted by a few windows and that they are suitable for shingling and siding work. These were likely discarded with shingles and siding as those were removed and cast aside. Nails that were pulled clear out of the wood were likely to have been thrown a distance away in order to keep them out from underfoot for safety reasons.

Looking at the patterns in Figure 16, it is likely that 3d nails at this site were being used for roofing and siding more than they were for the lighter window framing. This is also consistent with the shingled roof and sided upper story of the house in photographs of the Roland Reed Rancho.



**Figure 16.** The distribution of 3d nails across the site.



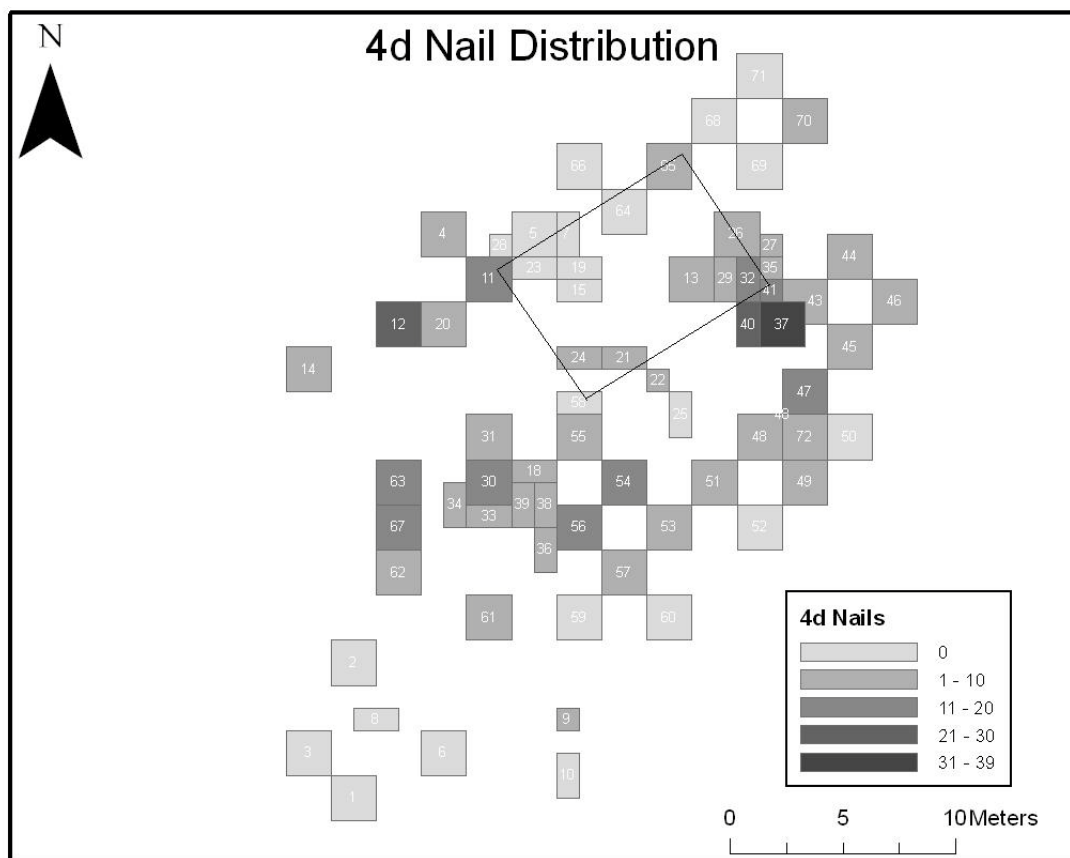
*Distribution of 4d Nails at the Site*

As mentioned in the data description, 4d nails are the most numerous size of nail at the site. Shown in Figure 17, these nails were used for a number of uses including different forms of interior work, shingling, and siding. In the case of this site, there are a number of large concentrations of these nails. The largest is located at unit 37 near the southeast corner of the proposed house location. The next highest concentrations are located at unit 12, followed by unit 11, units 63 and 67, and a around unit 56. Other units, with ten or fewer nails each, form a roughly rectangular pattern around the proposed location of the house similar to previous distributions.

These whole nails were likely discarded after bending or left in the wood pieces that held them as they were removed and discarded. Since these nails were associated with shingling and siding, it is not surprising that these nails are scattered across the site in multiple locations. Unit 37 is probably a location in which a number of discarded, shingles, pieces of siding, and removed nails were placed during the dismantling of the structure at BC. Unit 12, which has been confirmed as a refuse area, also contains these nails in large number and probably was where many old shingles and siding boards were discarded as the structure was repaired during the years and during its destruction. The concentrations in unit 11 and the others to the southwest of the proposed house location were probably also discard piles for these materials. Finally, the rectangular pattern of nails around the proposed house location is likely the result of nails being thrown out from underfoot during construction, during repair, and during the dismantling of the structure. Some 4d nails may have come from interior work such as cabinetry or finish,

though it is impossible to ascertain the existence and amount of such work from the photographs of the site.

The presence and distribution of so many 4d nails is consistent with photographs of the house from 1866. The photographs show siding and shingles on the upper story of the house that would have been removed in order to get at the more useful wood that made the frame of the upper story. In addition, these features would have been replaced occasionally during the life of the house as shingles and siding wore out. It is not surprising, then, to see so many nails of the 4d category and at locations where materials were being discarded or piled up. This makes the distributions consistent with evidence of salvage at the site as well. It should also be noted that the discard areas in this distribution also correspond to those found in the previous distributions. The activity areas located at units 63 and 67, around unit 56, at the southeast corner of the house location, and the rectangular pattern of nails surrounding the house all seem to be common themes. The 4d nails contribute greatly to the concentrations above for bent and straight whole nails and the distribution of all nails and fragments across the site ( Figures 11, 13, and 14).



**Figure 17.** The distribution of 4d nails across the site.

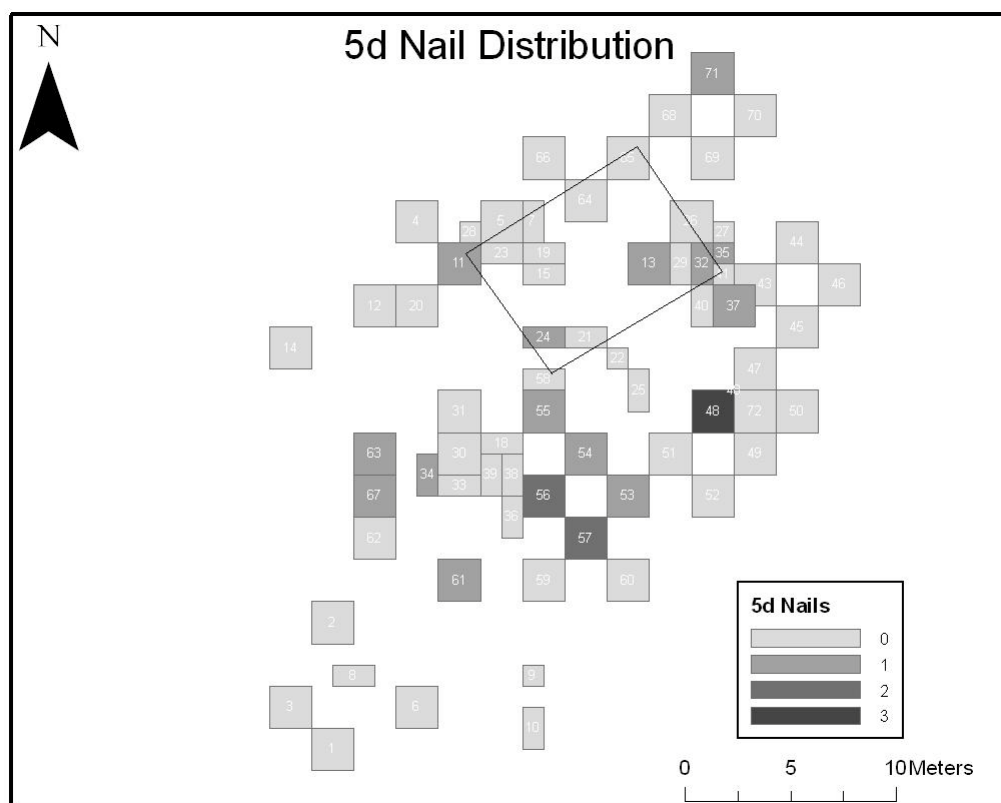
#### *Distribution of 5d Nails at the Site*

According to Table 2, 5d nails were used for moulding, finish work, ornamentation, or light framing of thin boards. None of the first three are present in photographs of the house's exterior, although all four can be interior features. In light of what we can see in the photograph, it is likely that these nails were used at the site for light framing or for shingling on the outside of the house (they are within the size range of 2d to 6d that was mentioned in the material expectations for framing and siding). Inside, they may have been used for moulding, light framing in the first and second story, finish work, and even ornamentation if it existed. However, their small number and low concentrations, shown in Figure 18, indicate that they were removed and reused during salvage or that they were

associated with minor framing. The largest concentration of these nails is at unit 48, with a smaller concentration at units 56 and 57, then a number of individual nails scattered at various location around the site.

The two main concentrations are near locations with high concentrations of pane glass at the site. Unit 56, for example is specifically mentioned in Johnson (2006: 113-115) as a locus with a high concentration of pane glass that may be associated with windows at the front of the house. Unit 48, upon examination of pane glass concentrations, also bears a high concentration of glass. Thus, it is likely that the 5d nails are associated with the smaller upper windows seen in photographs of the site. These windows had smaller frames than those near the front doors that could have been fastened by 5d nails. If that is the case, then they were discarded at the locations where 5d nails are present. The other, single nails scattered across the site may have been used for other purposes associated with shingling or siding. It is possible that a few were used for this purpose as well as the 4d nails.

The distribution of 5d nails seems consistent with the Roland Reed Ranche, especially in light of the existence of smaller window frames that could have been fastened with 5d nails on the upper story of the building. Their concentration near areas where pane glass is concentrated also supports this contention. Finally, the scattered state of the nails is in keeping with salvage evidence at the site.



**Figure 18.** The distribution of 5d nails across the site.

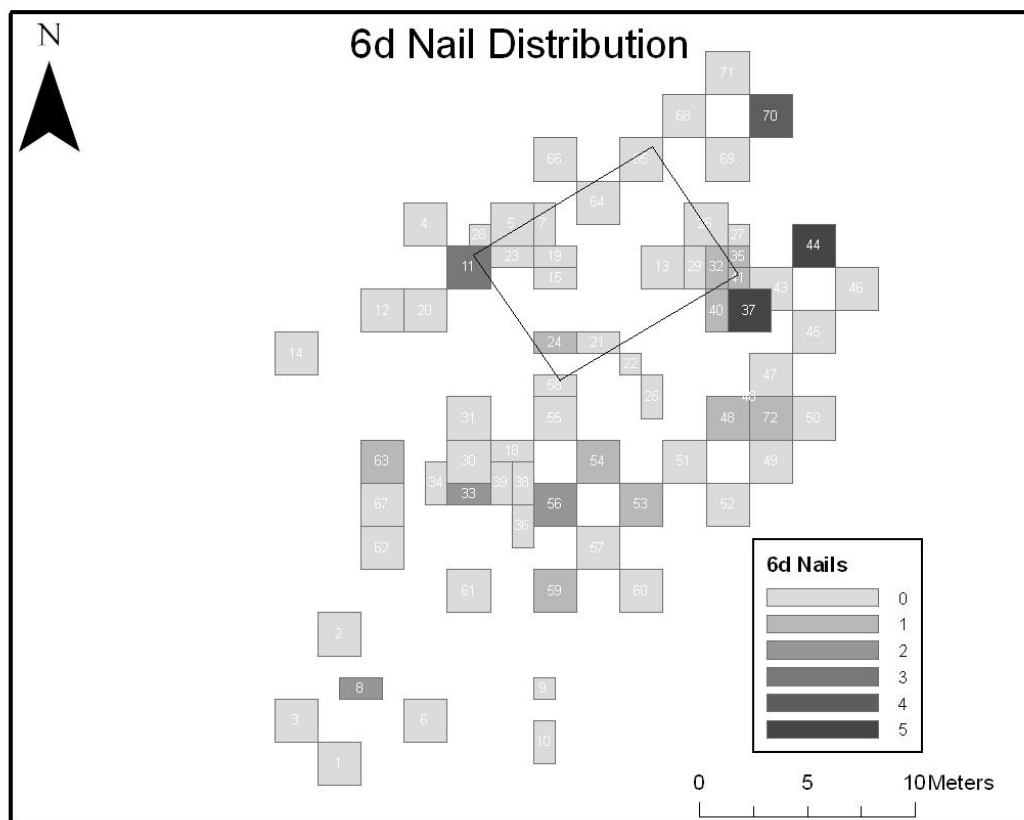
#### *Distribution of 6d Nails at the Site*

6d nails were used for a number of different fastening needs, including clapboarding, light framing, bevel siding, wood grounds, shingling, exterior trim, flooring, and finish. Of these things, the exterior photos of the house show that they were likely associated with light framing, flooring (on the upper story), siding, and shingling of the roof. Light framing and finish may have also been present inside the house, also contributing to the distribution and number of 6d nails. Figure 19 shows the distribution of a relatively small number of 6d nails at the site. The most prominent concentrations are located at the house's southeast corner, just east of that at unit 44, north of there at unit 70, and at unit 11. There are a few scattered nails to the south of the house location around unit 56 and more in the vicinity of the house's southern façade.

The concentration of these nails at the southeast corner is not surprising since many of the other nail assemblages also seem to show greater concentrations in that area. This area was likely a dumping area for unusable nails and wood in addition to a piling area for wood that may have still been salvageable. Shingles and siding, and their associated nails would have been discarded here. However, it seems that this area is also associated with high concentrations of pane glass (Johnson 2006: 113-115). Since the numbers of these nails are small, having only 14 nails near the house's southeast corner, it is more likely that they were associated with removed, medium window frames such as those found around the upper story window in Figure 8. It is also possible that, since they are on the higher end of the smaller nails sizes, may have been salvaged if kept whole and un-bent. 6d nails, as mentioned in the material expectations, may have been used for light window framing. The concentration at unit 70 and unit 11 is also not unusual since many other nail types have followed those trends as well (Figures 11, 12, 13, 14, 16, and 17). The 3d and 4d nails especially show similar concentrations of nails around unit 70 and unit 11. Since these two types of nails are associated with roofing, it is likely that the 6d nails are also associated in a similar way. The rest of the nails scattered across the site may have also been thrown aside as repairs to the roof or siding were made or has the building was dismantled.

The location of some of these nails at a major dumping/piling area, and in association with higher concentrations of pane glass seems consistent with the expectation that these nails were used for window framing, which is also consistent with photographs of the house. In addition, the location of the greater concentration near the east of the house, where there may have been another window, is also consistent with the photographs. The

rest of the nail concentrations are so sparse that no conclusions can be made. However, the concentration of nails at unit 11 is also consistent with the previous nail distributions.



**Figure 19.** The distribution of 6d nails across the site.

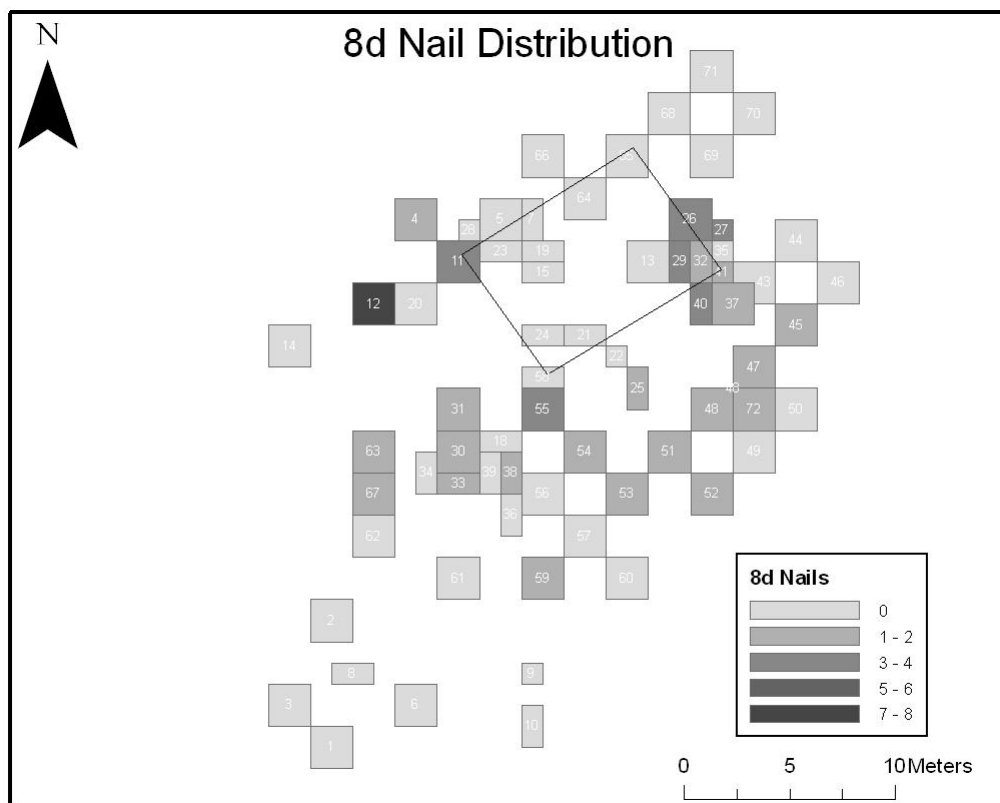
#### *Distribution of 8d Nails at the Site*

8d nails, generally associated with the structural activities of flooring, fastening wood grounds, fastening interior fittings, boarding, and exterior trim (Table 2) are the most numerous of the larger nails sizes found at BC. Figure 20 shows that these nails have the highest concentration in the trash pit at unit 12, followed by slightly lower concentrations at unit 11, unit 55, and centered about the southeast corner of the house. Around the house's southern façade, one finds the telltale rectangular pattern that denotes the location of the Roland Reed Rancho.

Most of these concentrations are not unexpected, such as those at unit 11, unit 55, just north of unit 56, and at the house's southeast corner. Since these nails were used for frame-boarding, the fastening of wood grounds, and flooring, it is likely that they were associated with the house's second story, being used to help support the frame of that area and floorboards that would have likely been present. It is also possible that they came from the interior of the second story, which may have sported some light framing boards and wood grounds for interior walls, and floorboards. Some of these wood materials, if still useable, would have had their nails removed and discarded in the areas where they were piled. The nails were also less prone to breaking and likely more salvageable, resulting in smaller numbers. The concentration of 8d nails at unit 12 is interesting because it is the only larger nail size present in that unit in a relatively large concentration. Nails of 5d and greater are very rare in that unit. This may indicate that smaller pieces of wood, such as grounds or broken floorboards were discarded in the trash pit as well. Finally, the rectangular concentration of nails around the house's southern side is probably the result of removed nails being cast aside to get them out from under foot during construction and dismantling activities.

These patterns above are consistent with the general shape and build of the house seen in the photographs, and it is likely that the 8d nails were associated with more than one of the purposes above. The fact that they have greater concentrations than other large-sized nails (6d – 10d) may indicate that they were associated with materials that were more likely to be discarded such as broken floorboards, wood grounds, or smaller framing boards.





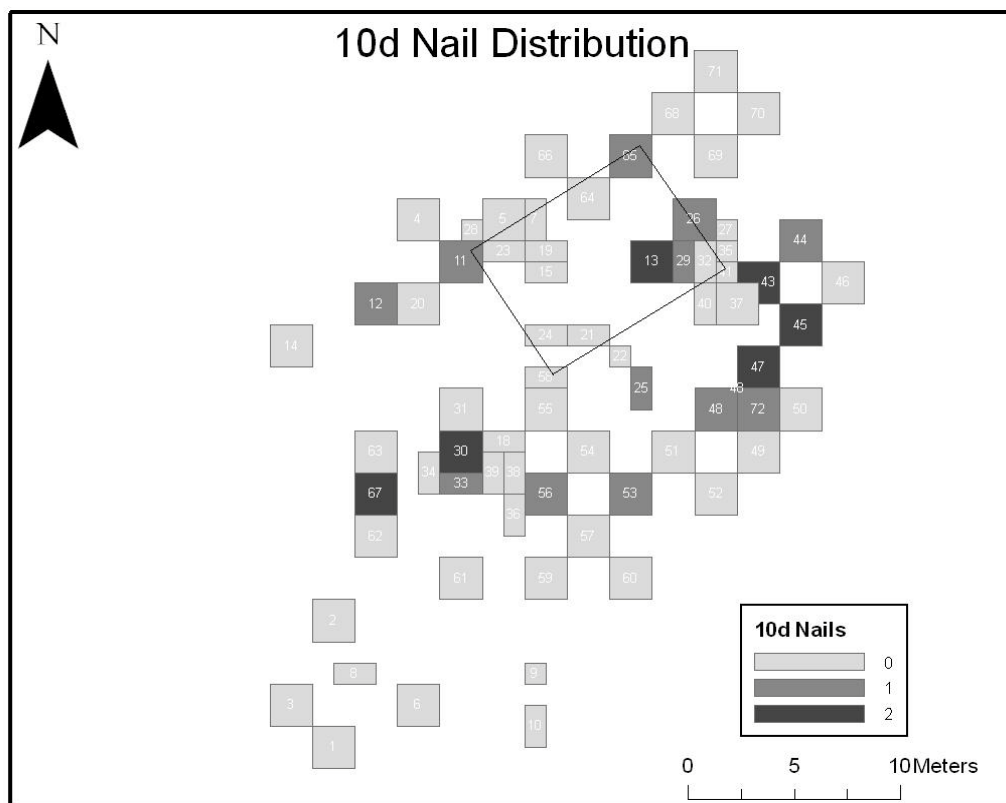
**Figure 20.** The distribution of the 8d nails across the site.

#### *Distribution of 10d Nails at the Site*

The 10d nails have the most associated uses according to Table 2. Among these, flooring, boarding, window and door framing, window trim, and, probably, stairs are all associated with BC. We cannot know if there were stairs in the house's interior. However, we can infer the presence of frame boarding, flooring, and door and window framing from the photographs of the Roland Reed Rancho. Nails of this size are sparse compared to other sizes. However, there are two clusters of nails that seem important. Shown in Figure 21, one is located around the house's southeast corner and just south southwest of the house's southwest corner. In addition, there is a subtle rectangular pattern of these nails around the house, though it is not as visible as with the other sizes of nails.

It should be noted that 10d nails were used to fasten boards that were more likely to be salvaged because of their greater size and resistance to breakage. Many 10d nails may have been taken along with these boards. Further, 10d nails are large enough to warrant recovery and re-use and this may have been salvaged themselves. Those that are seen at the site are likely the result of accidental discard or discard due to bending. The loose rectangular pattern is probably a result of this discard during construction or dismantling activities at the site. The two concentrations are near units 63, 67, and 33, unit 56, and the southeast corner of the house, the area where other wood materials concurrent with smaller nail sizes were likely discarded or piled during salvaging activities. These small concentrations are also near areas with high pane glass concentrations, so it is possible that these larger concentrations are areas where door frames and window frames on the two house fronts were dismantled, leaving a few nails behind. This seems to be the case, since unit 33 has a particularly high concentration of pane glass along with the units surrounding the southeast corner of the house (Johnson 2006:113-115).

This distribution of nails is difficult to draw conclusions from because of its small size. However, the rough rectangular shape of the nail distribution and the association of 10d nail concentrations with pane glass concentrations are consistent with photographs of the house. Some of the window frames seem almost as large as the door frames (Figure 10) and would have required 10d nails to fasten them to the rest of the house.



**Figure 21.** The distribution of 10d nails across the site.

## Discussion

The data shown above are consistent with the photographs of the Roland Reed Ranch from 1866. Both the descriptive statistics and the distributions show the structure yielded a high number of smaller nails, and some larger nails existed at the location where test-units were laid during excavations at BC. The preceding sections have shown that the largest number of nails at the site were in the smaller range that were used for shingling, siding, and light framing, all of which are consistent with photographs of the house. Even the straight nails, which are slightly more numerous than expected, seem to support quick removal of a lot of small pieces of wood and nails that would have been associated with the smaller structural elements of the house in the photographs such as windows, doors, shingles, siding, etc. The lack of larger nails also fits with the house's history of salvage,

where the larger nails used for heavier framing, rafters, and other large materials would be more likely to be salvaged or carried away in reusable wood.

The nail distributions act as evidence for the existence of a house with multiple structural components at the site. For example, a number of different piling and discard areas for salvage are seen throughout the different distributions shown above. The greatest is around the southeast corner of the estimated house dimensions, focusing on unit 37 and radiating outward about 5 meters (see Figure 9). This discard area contains nails from a number of different structural elements including window frames and trim, shingles, siding, and a few nails that were associated with larger pieces of wood used to frame the upper story of the house and, possibly, walls within the 1<sup>st</sup> story of the house. Another major concentration exists just southwest of the house's southwest corner, centered about unit 56 and radiating outward about 10 m to the west to include units 63 and 67 which seem to be a smaller, satellite staging area. This collection also contains nails associated with window and door framing components, shingles, siding, flooring boards and other light structural materials. These two large concentrations were likely associated with the facades of the house as shown in figure 8 with large door and window frames and a number of windows. The concentration of nails in unit 12 is consistent with evidence of a trash pit where discarded materials such as shingles and siding and smaller structural parts were discarded and burned as a result of repair during occupation of the house. Finally, the nails are ubiquitous across the site and seem to follow a pattern that roughly outlines a rectangular structure. This outline, concentrated to the south of the house outline is seen very clearly in eight of the distributions shown (Figures 11, 12, 13, 14, 16, 17, 20, and 21). The others hint at it to a smaller degree. This is consistent with

the shape of the house seen in the photographs. These discard areas, trash pits, and fuzzy outlines are also consistent with previous evidence of salvaging at the house. Salvagers would have used a number of places to pile discarded materials to make work more efficient and to prevent injury. The nail distributions pinpoint these locations despite the fogging effect of salvaging activities.

With the above data, we can now draw two major implications from the nails at BC. The first is that we can say with some certainty that the Roland Reed ranch existed at the location where excavation occurred. With that in mind, further studies and questions can build off of this evidence and try to find out more about how the people who built, dwelt in, and dismantled the ranch lived and handled the property. We can also pinpoint areas for further questioning, which will be discussed in the following chapter.

The second implication from this data is that *nails are useful*, especially in situations where salvaging has occurred and little structural materials remain. Understanding nail sizes and their possible uses has helped to find out what wooden materials were used then discarded at this site along with their general locations. It also helped to find an outline for the structure that existed here. Bent nails and nail fragments should not be ignored, either. They help show what areas were used for discard of broken nails and what areas were used for the discard of wood. In the case of this site, the locations were mixed, but it is still possible to differentiate from wood discard/piling areas and the areas where nails were cast aside to avoid injury during work. In the Great Plains, where wood is scarce and salvage occurs often, nails may be one of the only ways to determine what structures actually stood at a site. Coupled with historical images and documents whenever possible, they can be even more powerful as a discerning tool. With this in mind,

archaeologists in this region should not simply bag the nails together then forget them, thinking it is not worth their time to analyze these ubiquitous artifacts. Instead, if sufficient nails are present, they should take advantage of what evidence is presented and at least sort the nails quickly according to the variables described in Chapter 2. Making this effort will provide archaeologists in the Midwest and in other areas where salvage is common with another tool for understanding and interpreting structures at different sites.

## **Chapter 4: Odds and Ends: Suggestions of Further Study and Areas of Interest at Beaver Crossing**

The past chapters have shown that the nail patterns Beaver Crossing are consistent with photographs of the Roland Reed Ranch. These patterns showed a number of activity areas where multiple types of building materials were piled or discarded during salvaging of the site. In addition, a general rectangular pattern of nail concentrations reflected the proposed outline of the house at the excavation area. These insights were provided by the machine-cut nails found at BC. However, these were not the only fasteners that existed at BC. There are others, such as horseshoe nails, boot nails, non-nail fasteners, and fragmentary nails that can tell us more about activities at BC. There are a number of features at the site, such as the trash pit located at Unit 12 and a number of pits found near large concentrations of nails that show evidence of burning that could also reveal more information about salvaging at this site. In addition, there are other artifacts at the site, such as pane glass, that may reveal additional information when compared to distributions of nails at the site. And, finally, there are areas of the site that have not been excavated that, if they were excavated, might reveal more structural information about the Roland Reed Ranch. This chapter will discuss these other areas of interest and provide suggestions for studying them that will hopefully yield further understanding at the site.

### **Other Fasteners at Beaver Crossing**

Although the machine-cut nails at BC make up the vast majority of fasteners found at the site, there are a number of others that bear consideration. For example, other classes of nails included those that were identified as hand-forged nails, some that were

identified as shoeing nails, a small number identified as “boot nails”, and nails that had “cast” heads. The shoeing nails and boot nails were more firmly identified and are more numerous. Hence, they will be briefly discussed in this chapter. The hand-forged nails, largely identified in the 2005 nail collection, were determined to have been misidentified and are likely more machine-cut nails. Other non-nail fasteners, such as brads, a type of nail, staples, tacks, tines, screws, and very large nails identified as rivets will also be discussed briefly. Finally, although fragmentary nails have already been used in this thesis, they will be discussed in this section because they have the potential to yield more information.

### *Shoeing Nails*

Seventy-five shoeing nails were identified at BC from both the 2005 and 2006 nail collections. Shoeing nails were intended to be used for shoeing of animals such as oxen or horses and would have been in much use at BC since one of the activities that took place there was the care of livestock and pack animals by the Reed family. This was one of their chief services provided at the Road Rancho (Demers in press, Demers, Dempsey, and Johnson 2006, Johnson 2006). Looking at the distribution of these nails across BC would reveal activity areas in which shoeing occurred and animals were quartered. Looking at the ends of the nails and seeing whether they were bent or still straight would also reveal whether or not the nails had been used before or not. This study would be very useful in provided further information about where care of livestock took place around the Roland Reed Ranch.



### *“Boot” Nails*

There are 29 very small nails, found in 2006, that were classified as boot nails. The term “boot nails” refers to small nails that were used for fastening a thick sole to the rest of the boot. All of these nails were found in a cluster at Unit 43, which may indicate that they were part of a box of new nails, were dropped in a group at that place, or that they represent a pair of old boots. Further study with these nails might involve comparing their placement with other artifacts in Unit 43, revealing a possible work or storage area that existed before, during, or after salvage of the site.

### *Nails with “Cast” Heads*

Although head data was deemed unreliable for this study, there are 29 nails and fragments that bear discussion. These nails and their fragments were diagnosed as having “cast” heads, or heads that were cast at the end of nail production instead of stamped. Nails with this head type were used during the 1880s – 1890s (Demers, lecture 2009). *If* the identification of these nail heads is correct, it indicates that 29 of the nails at BC were discarded or left there *after* the occupation of the site by the Reed family. For instance, they may be associated with hunting blinds constructed later at the site. This would be consistent with ballistic evidence from the post-Reed era at the site (Demers, Dempsey, and Johnson 2006, Demers et. al. 2007). Further study of these nails should work to confirm whether or not they are truly cast heads. If so, then their distribution across the site, and their size, could reveal what items or structures were placed at the site after it was abandoned by the Reed family. This could also indicate the length of time that it took for salvage to occur at the site. Finally, further study of the use of cast heads and when it began could show if these nails were in use before their popularity in the last two decades

of the 19<sup>th</sup> century. If the Reed family had access to them, it means that they could get supplies from manufactories in the east fairly quickly.

#### *Other Fasteners*

Other fasteners at the site totaled 35 objects. Included in these were brads, staples, tacks, tines, screws, and rivets. Some of these, such as staples and metal tines, came from shovel tests on the west side of Beaver Creek. However, the rest are located within the excavation site at the location of the Roland Reed Ranch. The greatest numbers of these are screws, tacks, and rivets. Further examination of these objects should attempt to determine their age and use to see if they are actually associated with the 19<sup>th</sup> century deposits at the site. After that, looking at their distribution across the site would allow them to be associated with activity areas at the site. Further study of their uses during the 19<sup>th</sup> century would also be worthwhile.

#### *Potential Insight from Fragmentary Nails at BC*

Although the fragmentary nails at BC have already been discussed in this thesis, it is possible that they could yield more information. A fruitful and interesting study to pursue would be the attempt to correlate the thickness of a nail to its size. For example, machine-cut nails, in general, have a thicker shaft as nail size increases. Researchers could find out if thickness can be correlated to a range of nail pennyweights or even specific pennyweights. At BC, this study would require a type collection of the different pennyweights found at BC. After this collection was made, average thicknesses for each pennyweight could be measured. Statistical tests could then be done to determine if the average thicknesses for each pennyweight or range of pennyweights were significantly different. If that was the case, then fragmentary nails at BC could be identified as falling

into a certain pennyweight category. Looking at the distribution of this new data would reveal more structural data at the location of the Roland Reed Rancho and help in further distinguishing activity areas at the site.

## **Unit 12**

Unit 12 is unique at BC because it was excavated to depth and is a portion of one of the features found at the site in 2005. Feature 5, was a trash pit that would have been just behind the northwest corner of the house, making it less visible to travelers on the trail (Johnson 2006). During excavation, nine levels were dug within test unit 12 at varying levels and revealed a pit with evidence of burning along with a number of different artifact types scattered throughout. Of those artifact types, nails are abundant. Brief work was done on the nails in this unit to determine if there were any patterns. This research included looking at the numbers of nails by level, then observing the relationships between different nail attributes such as burned context and size or status as bent or straight and size. No major relationships were found. However, a basic count of the nails shows larger concentrations of more than twenty at levels 3 and 4, and a smaller concentration, greater than ten nails, at level 6. Further study of this pattern using other artifacts in addition to the nails could point to two occupations at the site, which fits with its history. It would also serve to understand exactly what artifacts were being thrown away and at what frequency during the site's occupation. This would yield insights into the lives of the site's inhabitants.

## **Other Features at the Site**

A number of other features at Beaver Crossing, representing either features with structural elements such as mortar, daub, and pieces of limestone or brick or those with

evidence of burning, correspond to the areas in which the BC nails are greatly concentrated (Johnson 2006). For example, features 1, 4, 5 (the trash pit where unit 12 was located), and 6 were all located at the northwest corner of the house where there was also a consistent concentration of nails around units 11 and 12 (a part of feature 4). In addition, feature 6 showed evidence of burning, indicating that this area, while a structural corner of the building, was more than likely also used as one of the staging areas for salvaging at the site. Unit 12, though used during site occupation, would have also been used to pile and burn discarded materials during salvage.

Features 3, 7, and 8 are also located very near the largest cluster of nail concentrations at the site, or the southwest corner of the house. Features 7 and 8 were largely structural, with limestone, mortar, and daub being found and indicating a house corner. Interestingly, feature 3, located at unit 13 where nail concentrations were consistently high, showed evidence of burning. This makes it likely that this corner was another site for performing salvaging activities and disposing of unusable materials.

Finally, feature 9, located at units 63 and 67, another area with consistently high nail concentrations, showed additional evidence of burning. Johnson (2006) also proposes that this feature marks the remains of the ell seen in the photographs of the Roland Reed Ranch. The number of nails at this feature does not refute this idea. However, it does suggest that the ell may have been burned and destroyed at that location *along with* nails associated with window and door frames and other materials that were discarded.

Further study of these features should focus on concentrations of different artifacts such as pane glass, bottle glass, ceramics, etc. Seeing how these artifact types compare with the nails at these features would further determine what was being burned and

trashed at these features and what areas were involved with structural demolition and disposal of materials and discard of other materials such as glass bottles, ceramic items, etc. Understanding this would be useful in developing patterns to look for at other salvaged sites in the Midwest and would help determine what people at the sites did not consider worth keeping as they salvaged the site.

### **The Effects of Soil Creep on the Site**

On any slope, it is possible, over time, for the force of gravity to move layers of soil or other material down-slope. This process has been termed “creep” by the geological community (Bates and Jackson 1984). Creep can affect archaeological deposits, moving them down-slope over time as well. Although no research has been done on this effect at BC, it is possible that the patterns we see at the site have also been affected by the movement of topsoil over time. Even though the rectangular mound excavated is on a gentle slope that approaches the river terrace, it is possible that the patterns of nails and other artifacts seen at this site were affected to some degree. Further investigation at the site might determine changes in elevation across the site then, using current literature on soil creep, determine the rate at which creep may have occurred here over time. Using that rate could help determine how far, if at all, artifacts were moved since the Reed occupation in 1871.

### **Further Excavation at the Reed Rancho Location**

Excavations of the rectangular mound in 2005 and 2006 were geared toward locating the extent of cultural materials in this particular area. In general, the outline of the house was determined along with the greatest extent of artifacts that could be found. However,

there are a couple of small areas that, if excavated, could reveal further information about the structure at the site.

#### *The House's "Inside" Portion*

Although much of the house's interior was already excavated (see Figure 9), there is still some space there that could be excavated. Further excavations here should focus on stratigraphy and comparison of artifact types found to confirm or refute the existence of floor-boards, furniture, cabinets, and the like. This information would take research beyond the photographs and help us to understand more about the house's interior set-up.

#### *Outside the House – Looking for the Ell*

The photographs in Figures 2 and 3 show an ell just behind the left front corner of the house whose long axis is perpendicular to the house's long axis. Since the nail data in this thesis and structural data presented in other works is consistent with a house at the location shown in Figure 7, the ell should be located in the western or northwestern portion of the site. Further excavation to the west and north of units 63 and 67 could reveal more nails and other artifacts that could help confirm the existence of the ell. Also, careful attention to stratigraphy and soil type in these excavations would also help determine the location and extent of discarded wood, daub, and other debris from the ell. Finally, the types of nails found, such as machine-cut or shoeing nails, would also be useful in determining the ell's use. Excavation here would be limited by the location of the present day river terrace's bank.

#### *Other Structures near the Eastern Excavation Area*

Figures 2 and 3 both show fences and another structure beyond the house and ell to the northwest. Since these structures may have fallen over the river terrace bank as it has

eroded over time, shovel tests between the creek and the terrace bank could reveal nails associated with fences along with the remains of what looks like an ell or a wall made of wood posts. Although finds are unlikely in a frequently changing alluvial setting, any finds of nails or other objects would at least suggest the existence of other structures to the west of the Roland Reed Rancho. If the structure to the northwest is an ell or wall, tests may reveal more nails and other items associated with the building of such a structure. Testing the soils of these shovel tests could also reveal the remains of wooden posts or other structural parts that have decayed over time.

### **Discussion**

The above suggestions for further study at Beaver Crossing will hopefully result in a better understanding of the site as a whole at the Roland Reed Rancho. However, these are not the only areas at the site left to study and future decisions for work or research at the site should be led by research questions that will guide these efforts. There are still many good questions to be asked about the nails at this site in addition to other artifacts that were found. Work at BC, like any archaeological site still in existence, is ongoing and will continue until researchers and students are no longer curious about its inhabitants and its role in westward migration during the 19<sup>th</sup> century.

### **Conclusion: Wrapping Up at BC (Or Not?)**

Further understanding of the Beaver Creek trail Crossing Site (25SW49), or BC, has been the chief goal of this thesis. The machine-cut nails, which presented a source of information that had not yet been fully tapped, provided a means to support the assertion that the excavations on the eastern side of Beaver Creek were taking place at the actual location of the Roland Reed Rancho, which had a log house that had been built and used at the site for nine years. The machine-cut nails are consistent with materials and the placement of the main building seen in two mid 1860s photographs of the Roland Reed Rancho (Figures 2 and 3). They are also consistent with other evidence of salvaging at BC.

The consistency of the nails with the photos of BC and its history has been shown through the descriptive statistics from the nail assemblage. These numbers are largely dominated by the presence of 2d through 10d nails, which would have been used for siding, shingling, window-framing, flooring, boarding, and other activities that were associated with materials abundant at the site. This is especially true for nails associated with shingling, siding, and window framing. In addition, there is a distinct lack of larger nails associated with medium to heavy framing, rafters, etc. that would have been used in the building's upper story along with any medium framing, wall-work, or flooring present in the lower story. These nails, from 12d to 16d, are extremely rare at the site and were likely taken along with the large pieces of wood that they were used to fasten.

In addition to the descriptive statistics, the distributions of the nails show a number of patterns that are consistent with the existence of a log house at the site. Of these, there is the rectangular pattern of nail concentrations that outlines the location of the house



proposed by earlier and ongoing research (Demers, Dempsey, and Johnson 2006, Demers in press, Johnson 2006). There are also a number of activity areas, focused mostly at the house's southeast and southwest ends that have a number of nails associated with materials such as siding, window frames (with the associated pane glass), and shingles, seen in the photographs. These areas also show that materials were piled to the south of the house at these sites, likely during salvaging activities. In all, there is ample evidence from the nails that their placement and distribution at the site is consistent with the photographs of the Roland Reed Ranche.

This data has led to the consideration that, at Midwestern sites where salvage has occurred, it is the nails that remain that may be the archaeologist's best friend in discovering structural elements of buildings. The nails could also be useful in placing these buildings in relation to the rest of the site and in identifying activity areas. It is reiterated here that nails at these sites should not be ignored nor should it be considered a waste of time to describe them and their provenience *in detail*. To ignore them would be like ignoring any other artifact at the site and would result in a major loss in information.

Hence, there are a number of directions that future research at the site could take. Some of these include nails and other fasteners that were not used as the main data in this thesis. Among these are horseshoe nails, boot nails, "cast" headed nails, fragmentary nails, other fasteners such as screws and tacks, and unidentified fragmentary nails. There are also the features that show structural evidence as well as evidence of burning at the site which are associated with the activity areas identified by the nails that could be studied with all artifacts present in mind. Also open to consideration is the effect of soil creep on the patterns discussed in this thesis and seen at the site as a whole. Finally,

further excavation at the site to locate the positions of ells and other outbuildings at the Roland Reed Rancho could be undertaken. It is recommended that these options be considered and taken with specific questions about the site in mind. Until those questions are exhausted, there is more work that could be done at BC.

Overall, the nails at BC have something to tell just like the other artifacts at the site. Now that we have more evidence that the Roland Reed Rancho once stood where the excavations in 2005 and 2006 took place, our questions should address the daily and individual lives of the people at this site. After all, archaeology is the study of past human behavior through the objects left behind. This thesis has provided grounds for further questions and study at Beaver Crossing in this regard, and it is hoped that this data, in tandem with other research on other artifacts and patterns on both the western and eastern side of the creek, archaeologists will be able to achieve a vision of the people of Beaver Crossing that goes beyond the historical record.

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## Appendix A: Data Summary for Entire Nail Assemblage at Beaver Crossing

### A.1 Number of whole and fragmentary nails

N/A	132	7.56%
Fragment	991	56.76%
Whole	623	35.68%
Total	1746	100.00%

### A.2 Head-type summary

N/A	612	35.05%
Machined	1084	62.08%
Hand-Made(?)	10	0.57%
Machine Cast	40	2.29%
Total	1746	100.00%

### A.3 Manufacture type summary

Machine-cut	1543	88.37%
Hand-forged	33	1.89%
Wire	8	0.46%
Shoeing	75	4.30%
N/A	23	1.32%
Boot Nail	29	1.66%
Brad	2	0.11%
Small Brad	1	0.06%
Staple	2	0.11%
Tack	6	0.34%
Tine	2	0.11%
Screw	14	0.80%
Rivet	8	0.46%
Total	1746	100.00%

### A.4 Number of whole nails by pennyweight

<2d	13	2.09%
2d	25	4.01%
3d	56	8.99%
4d	359	57.62%
5d	26	4.17%
6d	46	7.38%
7d	7	1.12%
8d	57	9.15%
9d	3	0.48%
10d	24	3.85%
12d	3	0.48%
16d	2	0.32%
20d	2	0.32%
Total	623	100.00%